Newsletter, Vol. 21, No. 1 (April - September, 2016) ISSN:0972-0774

CIFRINEWS

सिफरी समाचार

Hon'ble Union Minister of Agriculture and Farmers Welfare Shri Radhamohan Singh visiting ICAR-CIFRI, Allahabad centre

Dr. Trilochan Mohapatra, Secretary, DARE and DG (ICAR) addressing the ICAR- CIFRI staff at Barrackpore

Dr. B.K. Das assumed the charge of Director

Dr. B.K. Das joined as Director, ICAR-CIFRI on 30.07.2016. Before joining this institute, he was Principal Scientist at ICAR- CIFA, Bhubaneswar. A scientist of global repute working in the area of aquaculture, fish pathology and molecular immunology, Dr. Das has over 100 international research papers in leading journals to his credit. He is a visiting Fellow in the field of Nano-sensor Technology at Bourns College of Engineering, University of California, Riverside, USA. He is recipient of many honours and awards, including Jawaharlal Nehru Award for Outstanding Post Graduate Research, Lal Bahadur Shastri Young Scientist Award, Dr. Hiralal Chaudhuri Award, Dr. M.S. Swaminathan Award for Best Indian Fisheries Scientist and Krushakbandhu Award by Orissa Krushak Samaj. ICAR-CIFRI is proud to have him as Director and we are confident that the Institute would scale new heights under his able leadership.

Inside

हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

Agrisearch with a human touch

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Director's Column

I joined the institute as Director on July 30, 2016. It is a privilege and at the same time, a challenge for me to lead this prestigious Institute which has 70 years of legacy. However, I am quite confident that with the help and cooperation from all quarters of the staff, CIFRI's flag will continue to fly high.

The Institute has made a number of notable strides in the past six months. Interesting researches have been conducted on stock assessment, fisheries in Hooghly and Narmada estuaries, Chandil reservoirs, feeding in cages, stock enhancement in beels, economic loss due to fish diseases, climate change and fisheries, cage culture, etc. during this period. A number of important meetings have been conducted, including launching workshop of fisheries Project under Namami Gange, Advisory committee meeting of NASF project on Hilsa, IRC meeting, workshop on formulation of guidelines for cage culture in India, workshop on Aquatic animal diseases in Assam. Hon'ble Union Minister for Agriculture and Farmers Welfare; Secretary, DARE and DG, ICAR; DDG (Fisheries Sc.) visited the institute/centre during the period. ICAR foundation day, Independence day, National fish farmers day were celebrated with great fanfare and enthusiasm. Nine ARS scientists joined the institute to accelerate the CIFRI's growth story. I welcome suggestions to improve the quality of the Newsletter.

Jan, 2017

Dr. B.K. Das
Director

About ICAR-CIFRI

Started as Central Inland Fisheries Research Station in March, 1947 at Barrackpore, West Bengal, ICAR-CIFRI has carved a niche in inland fisheries research. Induced fish breeding, composite fish culture and other scientific fish production practices developed during the sixties by the Institute helped in bringing the blue revolution in the country. Reservoirs and wetland fisheries management technologies developed and disseminated by the institute resulted in enhanced fish production from these resources. By the turn of the year 2000, the research and development agenda of the institute concerning inland open waters shifted from fish as the only benefit to ecosystem health and ecological benefits with emphasis on sustainability, livelihood and nutritional security. In addition to the Headquarters at Barrackpore and two Research Stations at Kolkata and Kochi, CIFRI has four Regional Research Centres at Allahabad, Guwahati, Bengaluru and Vadodara, through which the issues of inland open water fisheries are being addressed.

Publication Team

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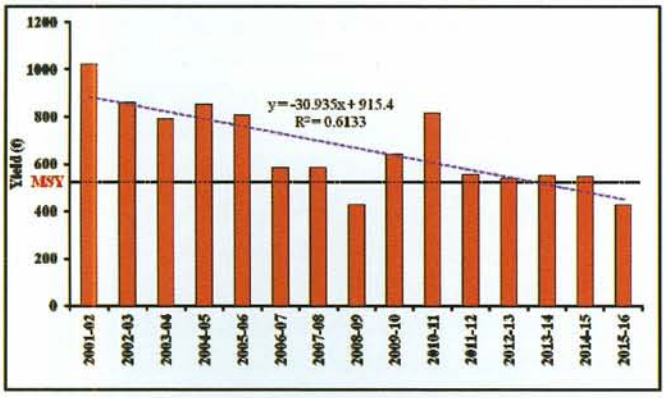
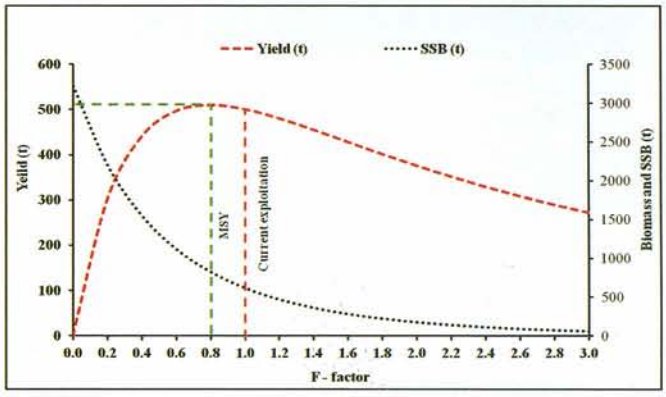
Research highlights

Stock status of Bengal corvina *Daysciaena albida* (Perciformes: Sciaenidae) in Chilika lagoon, Odisha

Daysciaena albida is a highly commercially important fish species of Chilika lagoon. The annual catch of the species from the lagoon in past 15 years showed progressive decline from 1024 t in 2001-02 to 431 t in 2015-16. The stock structure of the fish in the lagoon was assessed using annual catch and structured monthly length frequency data collected during October 2012 to September 2015. The analysis revealed that the level of fishing effort (F-factor) is 20% higher than that required for obtaining MSY (510 t). The Spawning Stock Biomass (SSB; larger than the mean size at first maturity: 270 mm) of the fish has declined to 19 % from its virgin stock biomass, resulting in low recruitment. The current length at recruitment (45 mm) and length at first capture (180.5 mm) of the species is lower than the levels reported during the 1970's (112 mm and 204 mm) is another indication of over exploitation. The existing fish stock is predicted to decline further if the prevailing scenario of exploitation continues. Hence, efforts needs to be put in place to reduce fishing pressure on the species by minimum 20% from the current level, to ensure sustainability.



Catch trend of *D. albida* in Chilika lagoon.



Thompson and Bell model of stock structure of *D. albida* in Chilika lagoon.

V. R. Suresh, S. K. Karna, M. Mukherjee, J. Mukherjee, D. Panda, Manas H. M., R. K. Manna, A. Raut and B. K. Das

Shift in fish catch structure along lower Sundarbans

Increase in the abundance of less commercially important fish species and drastic reduction in catches of commercially significant fish species has been established as climate change impacts on fish community structure by several studies worldwide. The estimation of fish landings from winter bag net fisheries along the lower Sundarbans (at Fraserganj) during 2015-16 and its comparison with the landing data of CIFRI during 2009-10, revealed a major shift in the fish catch composition. The percentage contribution of *Harpadon nehereus*, generally considered to be the most dominant species in winter bag net fishery, has reduced from 18.34 % (1362.92 t) in 2009-10 to 12.33 % (1475.29 t) in 2015-16. The winter fish catch is presently dominated economically less significant fish species, *Secutor insidiator,* which recorded a drastic increase in the landings from 0.09 % (1.37 t) in 2009-10 to 17.90 % (2140.57 t) during 2015-16. Similarly, there has been several-fold increase in the catch of sardines (represented mainly by *Sardinella gibbosa*, *S. longiceps* and *S. fimbriata*) which, currently contribute to 10.66 %.

Bumper landings of *S. insidiator* in winter bag net fishery (2015-16)

Sardines have become major components of winter bag net fishery

Roshith C. M, R. K. Manna, S. K. Das, A. Roy Chowdhury, C. N. Mukherjee, A. Mitra, A. Sengupta and D. Saha

Mud crab fishery – A lucrative and potential income resource of Sundarbans

Scylla serrata and *S. olivacea*, commonly known as mud crabs, are in great demand and fetches good market prices in domestic and export markets. Multiple baited line, locally known as *Don* is the most commonly used gear for catching mud crabs in middle and lower Sundarban. This gear is a low cost, passive and highly selective operated from wooden non-motorized boat of 6 to 8 meters overall length. This fishery is fully dependent on lunar cycle and tidal action; generally done only for about 15 days in a lunar month as crab fishing does not take place during neap tides. Average mud crab landing is 200 kg/boat/month during lean period (June to October) and 400 kg/boat/month during peak season (November to March). Size of catch ranges between 100 to 600 grams and its market value depends on its size, sex and quality. Female crabs fetch more price. Price of crab during winter season is about 2-2.5 times higher (about Rs. 75,000 to 80,000 per 100 kg) than that in summer months (about Rs. 30,000 to 35,000 per 100 kg).

Fisherman showing crab catch collected by scoop net

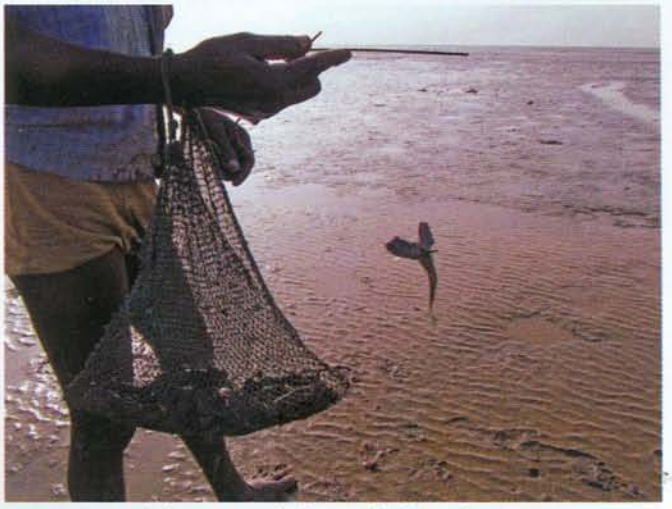
Scylla serrata

T. Nirupada Chanu, R. K. Manna, S. K. Das, S. K. Koushlesh, Roshith, C. M., D. Sudheesan and Manas H. M.

Mudskipper: the common man fishery at Narmada estuary, Gujarat

Mudskipper, locally known as "*Levta*", is recognized as common man fishery in the Narmada estuary owing to very low cost fishing and year round availability. The species needs special techniques to catch as it is very active out of water. Total production of mudskipper in the estuarine region was estimated to be 299mt during 2014-15 and contributed 17-18% of the total estuarine catch. Three mud skipper species were recorded from Narmada estuary namely *Boleophthalmus dussumieri* (Valenciennes), 1837, *Periophthalmodon schlosseri* (Pallas, 1770) and *Pseudapocryptes elongatus* (Cuvier, 1816) during the study period. Numerous fishing devices like "*fanda*" (fish hanged/gilled by thread), stake net, bag net, scoop net, push net, gill net, cast net etc. are being operated in Narmada estuary to catch mudskipper species along with other targeted species. The bulk of mudskipper catch (50-60% of total catch) comes from traditional "*fanda*" fishing operated by both male and female fishers in the middle and lower stretch of Narmada estuary during low tides. *Fanda* is a single hand operated fish catching device with catch per unit effort estimated around 0.25-2.0 kg/ hour. The mudskipper fetches around Rs. 70-120 / kg in fresh condition in the local market.

Mudskippers caught by "*fanda*"

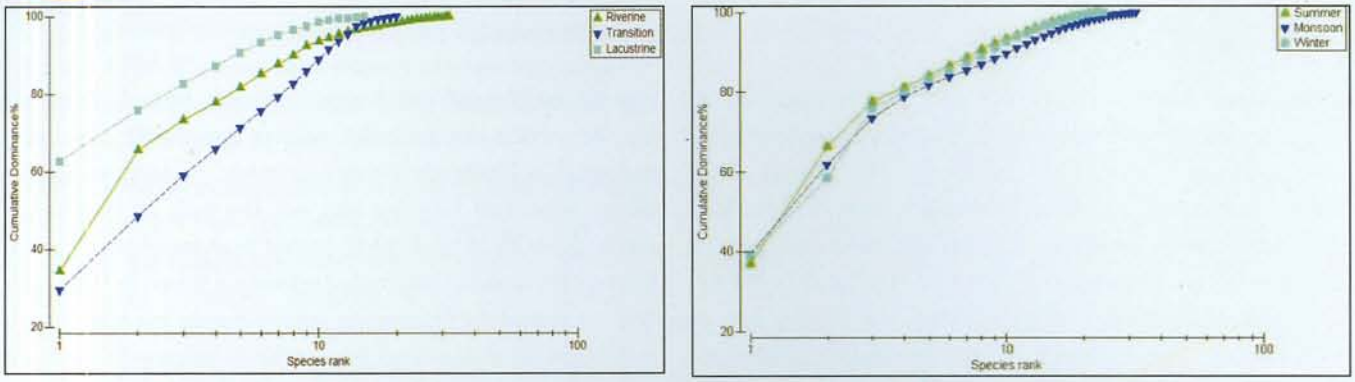


Fisherman with the mud skipper harvest

Dibakar Bhakta, W. Anand Meetei, Vaisakh G., S.K. Das and R.K. Sah

Spatio-temporal variation of icthyofaunal diversity in Chandil reservoir

A systematic study was carried out in Chandil reservoir, Jharkhand to determine the pattern of icthyofaunal diversity at different spatial and temporal scale. The periodic exploration in the reservoir recorded altogether 37 fish species. The icthyofaunal diversity assessment was made through spatially (riverine, transitional and lacustrine zones of the reservoir) and temporally (summer, monsoon and winter season) stratified sampling using gill net and drag net Permutational multivariate analysis of variance (PERMANOVA) indicated significant ($p<0.05$) spatial variations but non significant ($p>0.05$) temporal variations of the icthyofaunal diversity, which is also supported by the dominance plot of the diversity. Dominance plot of the fish diversity based on different zones of the reservoirs indicated that higher fish diversity in transitional zone, followed by riverine and lacustrine zones, but the dominance plot of the seasonal icthyofaunal diversity indicated that most of the seasons are having similar pattern of fish diversity. Similarity percentage (SIMPER) analysis indicated that small indigenous fishes viz. *Salmophasia phulo* and *Chanda nama* were the key species for that spatial variations in the reservoir.



Dominance plot showing the spatial and temporal variations of icthyofaunal diversity in Chandil reservoir

Lianthuamluaia, Sandhya K. M., U. K. Sarkar, Mishal P., Vikash Kumar, Suman Kumari, Gunjan Karnatak and A.K. Bera

Growth performance of *Labeo rohita* fed with brewery waste in cages

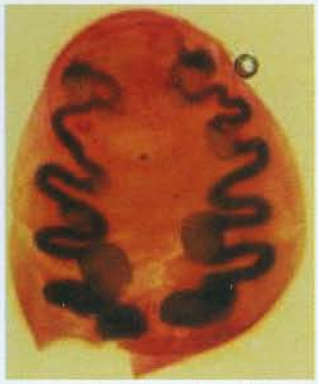
Over wintered seeds of rohu, with average size of 35-50g were stocked in GI cages of 5x5x3.5m^3 dimension at Maithon reservoir. The fishes were fed with experimental diets @ 5% of the body weight twice a day at two equal instalments at 10.00 hr and 16.00 hr during the experimental trial. Growth monitoring of fishes after 90 day of feeding trial revealed significant differences in weight gain %, SGR and feed conversion efficiency ($p<0.05$) between fish group fed with floating vs sinking, soybean based vs soybean + brewery waste (50% replacement). Significantly lower ($p<0.05$) weight gain and specific growth rate was noted in treatment group where 50% of the soybean meal was replaced by brewery waste. However, 50% replacement of soybean meal by brewery waste gives economic benefit of Rs 4.45 per kg of feed (16.4 % cost reduction) in comparison to soybean based feed.

M. A. Hassan, Md. Aftabuddin, D. K. Meena and Mishal P.

Detection of *Isoparorchis hypselobagri*, a digenean trematode in reservoir fish

During survey and fish stock assessment exercise in Chandil reservoir, Jharkhand fish samples were examined for disease occurrence. Spiny eel (*Mastacembellus armatus*) and aor-tengra (*Sperata seenghala*) were found to have black spots on ventral side of their body and muscle. On post mortem examination metacercerial stage of fluke were identified in body cavity and muscle of these two fish species. Preliminary study using conventional parasitological techniques revealed presence of metacercarial stage of *Isoparorchis hypselobagri* (Billet, 1898), a digenean trematode belonging to Isoparorchidae family. This observation is a first report from Chandil reservoir and its impact on fish health and fisheries need to be explored.

Black cysts with metacercaria of *Isoparorchis hypselobagri* in body cavity of *Sperata seenghala*

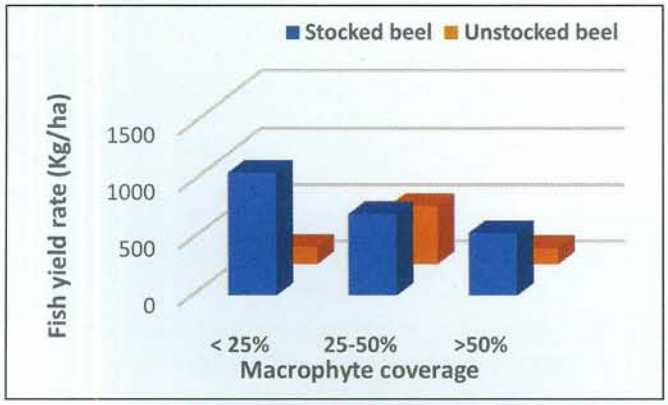


Semicon carmine stained metacercaria of *Isoparorchis hypselobagri*

A.K. Bera, Mishal P., Lianthuamluaia, G. Karnataka and U.K Sarkar

Macrophyte communities in selected beels of Assam in relation to stock enhancement

Macrophyte communities were assessed in ten stocked (closed/ seasonally open) and ten unstocked (open) beels (ox-bow lakes) located in 4 districts of Assam. Coverage of macrophyte in the selected beels varied widely from 5 to 80%. Free-floating macrophytes were mainly constituted by *Eichornia* sp. (>90%) in majority of these beels; other free-floating macrophytes observed were *Salvinia* sp., *Azolla* sp., *Pistia* sp. and *Lemna minor*. Among the submerged macrophytes, *Hydrilla* sp. was the dominant one, followed by *Vallisneria* sp. and *Ceratophyllum* sp. Rooted emergent macrophytes consisted of *Nymphea* sp., *Nelumbo* sp., *Nymphoides* sp. and *Trapa* sp. Marginal macrophytes were found in most of the beels in low quantities and consisted of *Ipomea* sp., *Colocasia* sp. and *Christella* sp. etc.



Fish yield rate vis-a-vis macrophyte coverage in stocked and unstocked beels.

Macrophyte infestation was categorised into three groups - low infestation (< 25%), medium infestation (25-50%) and high infestation (> 50%) coverage and the average fish yield rates of the beels in each group was calculated. In the stocked beels, lowest average fish yield (547.31 kg $ha^{-1}y^{-1}$) was observed in beels with high macrophyte infestation and the highest average fish yield (1076.59 kg $ha^{-1}y^{-1}$) in low macrophyte infested beels suggesting inverse relationship between fish yield and macrophyte coverage in stocked beels. The average fish yield in the beels with medium macrophyte infestation was 714 kg $ha^{-1}y^{-1}$. Macrophyte infestation rate also had management implications: lower macrophyte infestation helped in fishing and other fishery management. On the other hand, fishing and fishery management were difficult in beels with high macrophyte infestation. Stocking rate and fish production did not follow a definite trend in the selected beels. However, better managed beels were found to be stocked more rationally (3000-7000 fingerlings/ha) and in the other beels, the stocking was random, ranging from 500 to 70,000 fry or fingerlings/ha. Among the unstocked ones, the beels with medium macrophyte infestation had the highest average fish yield (507 kg $ha^{-1}y^{-1}$), whereas low and high macrophyte-infested beels had low average fish yield rates (147 and 139.6 kg$ha^{-1}y^{-1}$ respectively). Overall results suggested that moderate (25-50%) macrophyte coverage may support higher fish yield in unstocked beels, compared to low and high infestation rate.

S. Yengkokpam, B. K. Bhattacharjya, D. Debnath, A. K. Yadav, P. Das, N. Sharma, S. Borah, K. K. Sarma and N. S. Singh

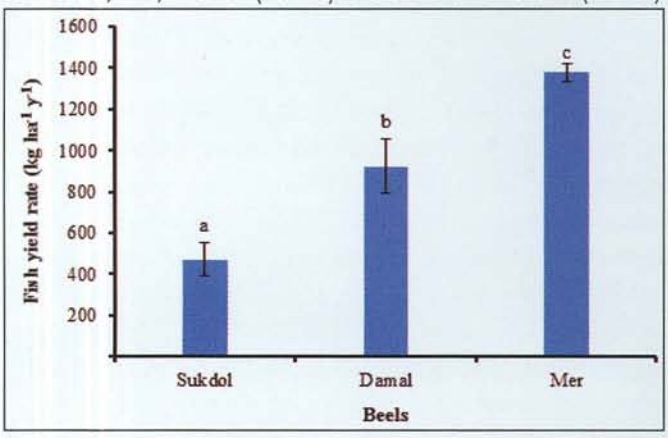
Length-weight relationship of nine indigenous fish species from Deepor beel of Assam

Length-weight relationships of nine small indigenous fish species, namely, *Puntius sophore* (Hamilton, 1822), *Amblypharyngodon mola* (Hamilton, 1822), *Trichogaster chuna* (Hamilton, 1822), *Trichogaster lalius* (Hamilton, 1822), *Trichogaster fasciata* (Bloch & Schneider, 1801), *Chanda nama* (Hamilton, 1822), *Parambassis lala* (Hamilton, 1822), *Glossogobius giuris* (Hamilton, 1822) and *Macrognathus aral* (Bloch & Schneider, 1801) were studied from Deepor beel, a Ramsar site located in Assam, India. The selected species belonged to diverse feeding groups (Herbivorous: 2; Zooplankton feeder: 1; Omnivorous: 3; Insectivorous: 1 and Carnivorous: 2). A total of 911 fish specimens were collected for the present study on a monthly basis from February, 2016 to August, 2016. The study calculated "b" value from 2.778 (for *Trichogaster fasciata*) to 3.35 (for *Amblypharyngodon mola*). Among the selected fish species, 4 species (*T. fasciata, T. lalius, C. nama* and *M. aral*) showed negative allometric growth, 2 species (*P. lala* and *G. giuris*) showed isometric growth and 3 species (*T. chuna, P. sophore* and *A. mola*) showed positive allometric growth.

S. Borah, B. K. Bhattacharjya, B. J. Saud, A. K. Yadav, D. Debnath, S. Yengkokpam, P. Das, N. Sharma, N. S. Singh and K. K. Sarma

Impact of fish stock enhancement on fish yield in beels of Assam

Impact of fish stock enhancement was studied in three beels of Assam, viz., Damal (15 ha) and Sukdol-Sarubari (17 ha) in Morigaon and Mer beel (19 ha) located in Nagaon districts. The selected beels represented three fish stock enhancement conditions: (a) no stocking/ capture fisheries (Sukdol-Sarubari), (b) supplementary stocking at moderate density @ 2000 nos./ ha (Damal) and (c) supplementary stocking at high density @ 3000 nos./ ha (Mer). One-way Analysis of Variance (ANOVA), applied for assessing the effect of stocking on the fish yield rate during the period of 2012-16, showed a significant difference ($p<0.05$) among the studied beels. Fish yield was the lowest in the un-stocked beel ranging from 367-717 kg $ha^{-1}y^{-1}$ (average 472 kg $ha^{-1}y^{-1}$). Between the stocked beels, fish yield was higher in Mer beel (range: 1300-1501 kg $ha^{-1}y^{-1}$, average 1381 kg $ha^{-1}y^{-1}$) than that in Damal beel (range: 767-1307 kg $ha^{-1}y^{-1}$, average 924 kg $ha^{-1}y^{-1}$), indicating significantly higher fish yield in the beel subjected to higher stocking density.



Bar diagram of fish yield in selected beels of Assam. Different small letters over error bars represent significant difference among the means

A. K. Yadav, B. K. Bhattacharjya, P. Das, D. Debnath, S. Yengkokpam, S. Borah, N. Sharma and N. S. Singh

Assessment of economic loss due to fish diseases and mortality in floodplain wetlands of Assam

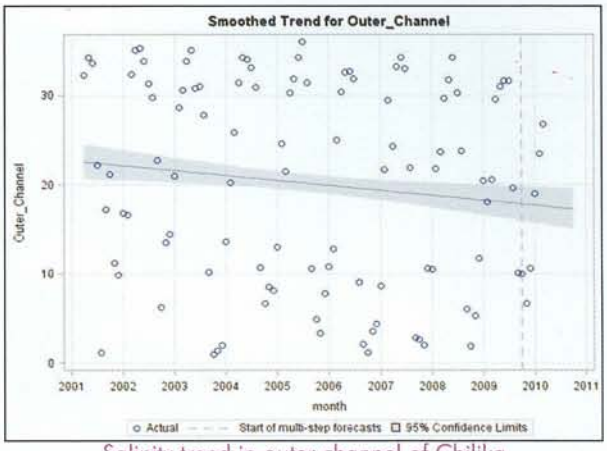
Surveys were conducted in 24 floodplain wetlands (beels) of Nagaon and 30 floodplain wetlands of Morigaon districts of Assam to assess economic loss from fish diseases and mortality. In Nagaon district, the average operational area of each beel and its production were recorded as 28 ha and 827 kg/ha, respectively. The average annual economic loss (as percentage of total production) and total economic loss (in ₹) were estimated at 13.46% and 3,66,205 per beel. The beels were mostly stocked with smaller fingerlings at higher stocking densities (average SD 27,159 nos./ha), which could be one of the reasons for higher loss in terms of money spent on fish seed. In Morigaon district, the average operational area of each beel and its production were recorded as 35.47 ha and 549 kg/ha, respectively. The average annual economic loss (as percentage of total production) and total economic loss (in ₹) were 11.05% and 8,445 per beel. The beels in Morigaon district were reported to be stocked at low densities (average 894 nos./ ha). Fish mortalities in beels were observed due to ulcerative diseases in winter, dropsy, fin rot, and occasionally "hole in the head". However, large scale mortality without any clinical symptoms takes place due to sudden environmental degradation from waste waters. Some of the predisposing factors for fish mortality in beels were identified as effluent/waste water discharge from domestic or commercial activities in the connecting river channels, large-scale jute retting in beels, indiscriminate stocking, excessive growth of macrophytes, mainly Eichhornia.

D. Debnath, S. K. Manna and D. J. Dev Nath

Salinity trend in the Chilika lagoon

Chilika lagoon consists of four ecological sectors i.e., Outer Channel, Central sector, Northern sector and Southern sector based on salinity gradients. The exchange of water between the lagoon and sea through tidal inlets and freshwater ingress through rivers lead to considerable spatial and temporal variations in salinity levels, which in turn affect the biological functions of the lagoon. Historical average monthly time series data on salinity of the four sectors from March 2001 to March 2010 was analyzed using Structural Time Series Modeling (STSM). The monthly average salinity

(ppt) in March 2001 and March 2010 were 32.2 and 26.76 in Outer Channel, 12.94 and 9.68 in Southern sector, 12.71 and 6.83 in Central sector, 5.49 and 3.62 in Northern sector, respectively. Results revealed significant ($p < 0.05$) annual fluctuation of salinity in Central sector ($R^2 = 0.65$), Northern sector ($R^2 = 0.44$) and Southern sector ($R^2 = 0.71$). However, there has been significant ($p < 0.05$, $R^2 = 0.67$) linear decline in salinity in Outer Channel (Fig.). This indicate progressive decline in freshwater ingress into the lagoon over the years, probably due to sedimentation of sea mouth, suggesting bathymetric investigation of the current status of the sea mouth.

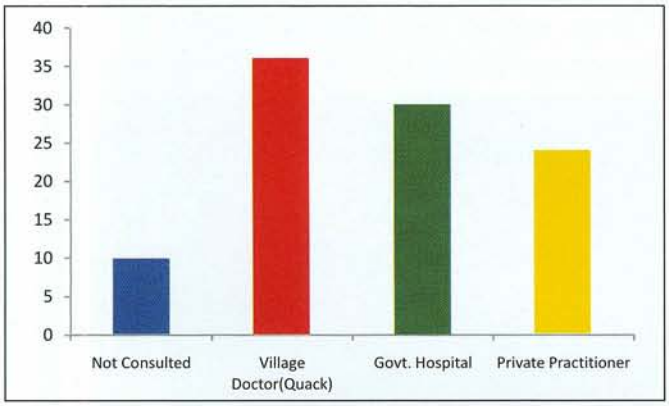


Salinity trend in outer channel of Chilika

R. K. Raman, V. R. Suresh, S. K. Karna and B. K. Das

Food consumption and morbidity pattern of the fishers of Namkhana Block, Sundarbans

Survey conducted in Madanganj, Namkhana in the Sundarban area revealed that local people largely preferred Indian Major Carps (IMC) as compared to Small Indigenous Fishes (SIFs). People of low income group (23%) tend to consume local estuarine fishes like "Lote" (*Harpadon nehereus*), "Chuno" (*Stolepherus* sp.), "Gang mourala" (*Escualosa thoracata*), "Amudi" (*Coilia* sp.) etc. to meet their protein needs. Fishes contributed more than 95% of the protein consumption of the village people, and chicken, mutton and egg consumption are meagre. Consumption of pulses mostly Khesari (*Lathyrus sativus*), was found to be occasional. The morbidity pattern of the villagers revealed linkage between poverty, under-nutrition and lack of hygiene. The most prevalent health issues were eye disease, fever, diarrhoea, skin diseases, headache and joint pain. A look into their treatment seeking behaviour revealed a tendency to consult non-qualified village doctors (36%) over qualified doctors, mainly due to economic reasons.



Treatment seeking behaviour of people of Namkhana area

Aparna Roy, Md. Aftabuddin, Archana Sinha, Pranay Parida, Abhishek Ghosh and Supriti Bayen

Changing pattern of Chlorophyll-a content and climatic variability in Lower Ganges Basin

A study was carried out to determine the effect of selected environmental variables on Chlorophyll-a (chl-a) concentration in the freshwater stretch of river Hooghly at Tribeni and Godakhali. The study showed a positive correlation ($p<0.01$) of chl-a with air temperature and total alkalinity while a negative correlation ($p<0.01$) had been established with nitrate. Present study also showed an increased level of chl-a concentration in the freshwater stretch of river Hooghly in comparison with the previous study (Bhaumik and Sharma, 2012) at Tribeni (0.025 µg/l) and Godakhali (0.012 µg/l). Further, the negative relationship between Chl-a and nitrate would be validated by the fact that phytoplankton community utilizes the nitrate content of the water for theirecological functions. A strong negative correlation between dissolved oxygen and air and water temperature stands as an

evidence for the rapid breakdown of detritus due to temperature rise in tropical aquatic ecosystem. A positive correlation ($p<0.05$) of chl-a with pH and specific conductivity showed the assimilation of CO_2 by primary producers leads to higher pH value. In terms of the relative importance of individual environmental parameters influencing chlorophyll- a concentration, water temperature (% of $R^2= 33.13$) was the most important and place effect was least important (% of $R^2= 3.4$) among the studied climato-hydrochemical parameters considered.

Soma Das Sarkar, U. K. Sarkar, M. Naskar, K. Roy and A.K. Bose

Influence of climatic variables on fish production in Bhomra wetland, West Bengal

Bhomra wetland in Nadia district of West Bengal is a semi-closed ox-bow wetland with water spread area of 45.7 ha, of which active fishing is carried out in 20-25 ha area. Climate change analysis during 1985-2015 with downscaled and high definition grid data over Bhomra beel indicated 0.18°C rise in mean air temperature and 185 mm decrease in total rainfall over the area. Stepwise regression with 15 years fish production data (2000-2015) revealed a positive relationship between fish yield and mean air temperature ($r=0.517$, $p<0.05$) while fish harvesting efficiency was inversely related to rainfall ($r= -0.543$, $p<0.05$). Preliminary studies indicated that if the present trend of climate change over the region continues to proceed at same pace, an increase in both fish yield (+112.55 kg/year) and fish harvesting efficiency (+2.27 percent/year) is likely be expected. Positive correlation of fish production with temperature may be attributed to higher growth rate due to increased plankton production through higher nutrient cycling, while the inverse relation with rainfall may be due to reduced fishing activities, closed fishing, and escapement of stocked fishes owing to flooding. The study suggests rise in temperature over the years within physiological range of fish species will have beneficial impact on fish production. However, aggravating water stress and sedimentation in Bhomra wetland may adversely affect water retention capacity and thus fish production from the wetland in future.

Bhomra Beel (22°58'49.2"N 88°37'48.0"E), Nadia, West Bengal

G. Karnatak, U.K. Sarkar and K. Roy

Collaborative fish stock enhancement programme at Sorbhog beel, Barpeta district of Assam

ICAR-CIFRI Regional Centre, Guwahati carried out fish stock enhancement programme in Sorbhog beel (34 ha), Barpeta district of Assam under the NEH component of the Institute in collaboration with AFDC Ltd., Guwahati. Fingerlings of *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* were stocked in the beel @ 3,000 nos./ha in October, 2015.The first and second sampling was carried out after 3 and 6 months of stocking. Good growth performance was observed in rohu with a weight gain of 330.67%, followed by catla (238.9%) and mrigal (81.56%).

B. K. Bhattacharjya, P. Das, S. Borah, S. Yengkokpam, D. Debnath, A. K. Yadav, N. Sharma, N. S. Singh and K. K. Sarma

Cage culture in reservoirs of Himachal Pradesh: An initiative by ICAR-CIFRI

The Institute is implanting demonstration of cage culture technology in Himachal Pradesh reservoirs in collaboration with Department of Fisheries, Govt. of Himachal Pradesh. A total of forty eight (48) HDPE floating cages (6mx4mx4m) have been installed at Bhakra in Govindsagar and Khatiyar in Pong reservoir. Fish seed of *Pangasianodon hypophthalmus* (Pangasius) of average 50 mm siz (0.8-0.9 g weight) were stocked in Govind sagar reservoir and Pong reservoir during May 2016. The stock is regularly monitored for growth, feed intake and health.

A.K. Das, U.K. Sarkar, D. Panda, Vikash Kumar, P. Mishal , G. Karnatak and B.K. Das

Trainings conducted

Sl. No.	Name of the training	Date	Venue	Participants
1	Inland open water fisheries management & development	June 02-08, 2016	CIFRI, H.Q. Barackpore	24 farmers from Muzaffarpur,Bihar
2	Inland open water fisheries management & development	June 22-28, 2016	CIFRI, H.Q. Barackpore	26 farmers from E.Champa-ran (Motihari), Bihar
3	Inland open water fisheries management & development	July 02-08, 2016	CIFRI, H.Q. Barackpore	30 farmers from W. Cham-paran (Betia), Bihar
4	Inland Fisheries Management for P.G. Students	July15-24, 2016	CIFRI, H.Q. Barackpore	Student of P. K. Roy Memorial College, Dhanbad (14) & P.G. Studentsof Vinoba Bhave University,Hazaribag(6).
5	Inland open water fisheries management & development	July 22-28, 2016	CIFRI, H.Q. Barackpore	27 farmers from Vaishali, Bihar
6	Application of Statistical tools for assessment of aquatic ecology and fisheries	August 02-12, 2016	CIFRI, H.Q. Barackpore	6 project staff from Wetland Researchand Training Center, CDA, Balugaon, Odisha
7	Inland open water fisheries management & development	August 04-10, 2016	CIFRI, H.Q. Barackpore	25 farmers from Gopalgunj, Bihar
8	Inland Fisheries Management	August 06-16, 2016	CIFRI, H.Q. Barackpore	7 M.F. Sc. Students of CIFE Mumbai under FRM Division.
9	Inland open water fisheries management & development	August 22-28, 2016	CIFRI, H.Q. Barackpore	26 farmers from Saran, Bihar
10	Inland Fisheries Management	August 29-01, 2016	CIFRI, H.Q. Barackpore	12 DoF Officials from Chhattisgarh
11	Skill Development Training on inland open water fisheries management & development	September 02-08, 2016	CIFRI, H.Q. Barackpore	28 farmers from Samastipur, Bihar
12	Inland open water fisheries management & development	September 17-23, 2016	CIFRI, H.Q. Barackpore	28 farmers from Saharsa, Bihar

Exhibitions

Sl. No.	Date	Name of the programme	Place
1	April 24-25, 2016	Punjab Fish Festival-2016	GADVASU Ludhiana
2	April 27-29, 2016	3rd PAFCongress and Seminar on Social entrepreneurship in aquaculture	ICAR-CIFE, Mumbai
3	August 10 -14, 2016	20th National Agriculture Exhibition, organised by Central Calcutta Science & Culture Organization for Youth	Surer Math, Dum Dum
4	September 22-23, 2016	Jharkhand Matsya Mahotsav-2016	Vidhan Sabha Ground, Dhurwa, Ranchi

Exposure / Educational Visits of Farmers/Students

Sl. No.	Particulars of visitors	Date
1	Seven M. Sc. (4th Semester with Fish Biolo & Fisher Science) students & two Professors-In charge from Department of Zoology, Pandu College, Guwahati University	April 21, 2016
2	Fortythree B. F. Sc.(Final year) students & two Professor-Incharge from College of Fisheries, Mangaluru	May 03, 2016
3	Twelve P. G. students, Dept. of Zoology (Fishery & Aquaculture Special) & two Professors-In charge from Vidyasagar College, Kolkata	June 01, 2016
4	Twentythree School Teachers from Kendriya Vidyalaya	June 06, 2016
5	Twenty trainees from Manipur, IFTC	July 25, 2016
6	Twentyone M.F.Sc. students (3rd year)& one Assistant Professor In charge from College of Fisheries, Nellor, Andhra Pradesh	August 06, 2016
7	Sixteen B.F.Sc. students from College of Fisheries, Raha, Assam	September14, 2016
8	Twenty final year B. F. Sc. students & two Professor-Incharges from College of Fisheries, GBPUAT, Pantnagar, Uttrakhand	September 18-21, 2016

Awards/ Recognitions

- Dr. Archana Sinha, Principal Scientist, was awarded with the *Bharat Gaurav* Award by India International Friendship Society, New Delhi.
- Dr. B. K. Bhattacharjya, Principal Scientist, continued to be the Expert Member of Assam State Biodiversity Board, Guwahati.
- Dr. Pronob Das, Scientist, served as the Expert in Aquaculture in All India Radio, Guwahati.
- Dr. U.K. Sarkar, Head of RWF Division, was recognised as an Expert Member for the project review committee of the Department of Scientific and Industrial Research (DSIR), Govt. of India, New Delhi. He Co- Chaired the technical session and also acted as invited speaker in the National Conference on Mahseer Conservation held at Indore from 8-10 September, 2016. He was also invited as a Technical Expert by the State Fisheries Department, Govt. of West Bengal for delivering talk on the occasion on Wetland Day on 16.06.2016.

New appointments

Nine ARS Scientists joined the institute in April 2016

Mr. Himanshu Sekhar Swain
Aquaculture

Mr. Tasso Tayung
Aquaculture

Mr. Mitesh H. Ramteke
Aquaculture

Ms. Prajna Ritambhara Behera
FRM

Mr. Pranob Gogoi
FRM

Ms. Pritijyoti Majhi
FRM

Mr. Shravan Kumar Sharma
FRM

Mr. Vikas Kumar
Agri. Chemicals

Mr. Satya Narayan Sahoo
Fish Health

Superannuations

Name & Designation	Last place of posting	Date of superannuation
Shri M. Balmiki, SSS	ICAR-CIFRI, Barrackpore	May 31, 2016
Shri A. K. Goswami, STA (T-4)	ICAR-CIFRI Guwahati RRC	June 30, 2016
Shri K. C. Das, SSS	ICAR-CIFRI Guwahati RRC	June 30, 2016
Shri G. Lal, SSS	ICAR-CIFRI Allahabad RRC	July 31, 2016
Shri U. Nayak, SSS	ICAR-CIFRI, Barrackpore	July 31, 2016
Shri J. Balmiki, Senior Technician	ICAR-CIFRI, Barrackpore	August 31, 2016
Shri A. K. Bhanja, SSS	ICAR-CIFRI, Barrackpore	August 31, 2016
Smt. Anita Majumder, AAO	ICAR-CIFRI, Barrackpore	September 30, 2016

Transfers

Name & Designation	From	To
Shri. Gulshan Kumar Sharma	ICAR-CIFRI, Barrackpore	ICAR-CAZRI, Jodhpur
Mr. Ningthoujam Samarendra Singh	ICAR-CIFRI, Barrackpore	ICAR-CIFRI, Guwahati,RRC
Mr. Vaisakh G., Scientist	ICAR-CIFRI Allahabad RRC	ICAR-CIFRI, Vadodara,RRC
Dr. Debabrata Panda, Scientist	ICAR-CIFRI, Barrackpore	ICAR-CIFA, Bhubaneswar

Promotions

Name & Designation	Promoted to	With effect from
Dr. D.N. Jha, Scientist	Scientist, RGP 7000	November 06, 2013
Shri Sanjeev Kumar Sahu, Scientist	Scientist, RGP 9000	February 25, 2014
Shri Tarun Kanti Halder, Sr. Technician	Technical Assistant	August 12, 2014
Dr. Absar Alam, Scientist	Scientist, RGP 7000	August 14, 2014
Shri Santosh Kumar Biswas, S.T.A.	Technical Officer	February 03, 2015
Shri Amulya Kakati, Technician	Senior Technician	May 25, 2015

Meetings

Launching of fisheries project under *Namami Gange*

Launching ceremony of the prestigious project "Assessment of Fish and Fisheries of the Ganga river system for developing suitable Conservation and Restoration Plan" sanctioned by National Mission for Clean Ganga (NMCG) under *Namami Gange* was held on July 07, 2016 simultaneously in the institute head quarter at Barrackpore and Allahabad Regional Centre.

Meeting at Barrackpore

Meeting at Allahabad

The programme at Barrackpore was graced by Prof. R. K. Kole, Head, Dept of Agricultural Chemicals, BCKV as Chief Guest and Dr. M. K. Das, Former Head, FREM Division, CIFRI as Guest of Honour. The launching function at Allahabad Centre was inaugurated by Shri Shyama Charan Gupta, Member of Parliament (M.P.), Allahabad. The various activities envisaged under the project during its 5 years duration include exploratory survey of the river Ganga; assessment of fish diversity and composition at selected sites; stock assessment of selected cold and warm water species; seed production of selected fish species from riverine brooders and ranching in depleted river stretches; awareness programs, identification of conservation sites and preparation of the fisheries conservation and restoration plan for the Ganga river system.

6th Advisory committee meeting of NASF project on Hilsa

The sixth Advisory Committee Meeting of the project "Stock characterization, captive breeding, seed production and culture of hilsa (*Tenualosa ilisha*)", funded by ICAR-National Agricultural Science Fund (NASF) on a consortium mode involving six ICAR fisheries research Institutes (CIFRI, NBFGR, CIFE, CIFA, CIBA, CMFRI) and one University (Viswa Bharati University), was held during 30-31 August 2016 at the Institute Hqs, Barrackpore. The Advisory Committee reviewed the progress of project. Dr. K.K. Vass, former Director CIFRI and Chairman stressed the need for achieving all the committed deliverables on time. Dr. P. K.

Agrawal, ADG, NASF, emphasised need for protection of raw data and information generated through the repository system of NASF. Dr. B. K. Das, Director, ICAR-CIFRI, stressed upon the committed deliverables; more research attention on breeding and culture of hilsa. Dr. K. G. Padmakumar, Director, International Below Sea Level Farming Research Institute, Kerala and member of the advisory committee emphasised the need to look into the impact of climate change on hilsa and also stressed on aspects of developing hilsa broodstock under captivity. Mr. R. F. Lepcha, Additional

Meeting at Barrackpore

Director, Dr. Saptarshi Biswas, Assistant Director, Department of Fisheries, West Bengal and members of the advisory committee also participated in the meeting. The committee suggested that ICAR-CIFRI should formulate policy guidelines for hilsa management based on the findings of the project. On 31st August, the Advisory Committee and the project partners visited one of the partner Institute, the Regional Research Center of ICAR-CIFA at Kalyani, to monitor the activities and progress made under the project.

Filed visit to ICAR-CIFA, Kalyani farm

IRC meeting

The Institute Research Committee Meeting 2015-16 was held at Barrackpore during May 23-25, 2016. Dr. V. R. Suresh, Director (Acting) chaired the meeting. All the Scientists including the Scientist probationers attended the meeting. The house recounted the contributions of Prof. A. P. Sharma, former Director of the Institute and paid tributes to two CIFRIans, Prof. H. P. C. Shetty and Mr. James Murmu,

who passed away recently. In his initial remarks, the Chairman stressed that the research programmes of inland open water fisheries need to be based on ecosystem approach with focus on sustainable management. He urged all the Scientists to fulfill the targets assigned to them within the stipulated time as most of the projects will be ending by March 2017. He also stressed on critical analysis and interpretation of the results. He then briefly presented the recommendations of Research Advisory Committee (RAC) meeting held during March 2016. All the Scientists presented their research and other achievements made during 2015-16 which were critically assessed and recommendations/ action points suggested.

and Shri Bimal Borah, Hon'ble MLA, Tingkhong legislative constituency, Assam graced the valedictory session of the workshop. A total of 77 participants including fish farmers and Fishery Extension Officers, Deputy Director and Joint Director from Department of Fisheries covering 17 districts of Assam; officials from National Fisheries Development Board Regional Centre, Guwahati; College of Fisheries (AAU), Raha, FISHCOPFED Regional Centre, Guwahati, Fisheries NGO and private sector enterprises participated in the workshop.

Meeting of the ICAR retired employees association

The ICAR retired employees association meeting was organised at ICAR-CIFRI, Barrackpore on 27 September, 2016. The Director of ICAR-CIFRI chaired the meeting. Dr. K.K. Satapathy, Ex-Director, ICAR-NIRJAFT, Dr. Dipak Sarkar, Ex-Director, ICAR-NBSS & LUP, Dr. Samir Kanti Naskar, Ex-Director, ICAR-Central Tuber Crops Research Institute and 50 other ICAR retired employees participated in the meeting. During the meeting, the matters related to pension, medical facilities of pensioners and other related issues were discussed.

Events

DDG (Fisheries Sc.) visited ICAR-CIFRI

Dr. J. K. Jena, DDG (Fisheries Sc.), ICAR, New Delhi visited ICAR-CIFRI for the second time in this year on May 20th 2016. He interacted with all the Scientists and enquired about the ongoing research projects. He also discussed the administrative and financial issues with the administrative and financial staff of the institute.

Union Minister for Agriculture and Farmers Welfare visited Allahabad Regional Centre of ICAR-CIFRI

Shri Radha Mohan Singh, Honourable Union Minister of Agriculture and Farmers Welfare visited Allahabad Regional Centre of the Institute on 13th June 2016. While addressing the staff, he stressed upon need of dissemination of technologies developed by the institutes to end users. He suggested the scientists to submit approved technologies in DARE/ICAR e-book for better visibility of research work. He felt the need for conservation of valuable indigenous fish diversity and control on rapid invasion of exotic fishes in the major rivers. He also emphasized greater need of involvement of scientists in *Mera Gaon Mera Gaurav* and other central sponsored schemes. He appreciated the ongoing works of the Centre on open water fisheries resources of the region, demonstration and up-scaling of pen culture for fish yield enhancement from wetlands and new initiatives on conservation and restoration of valuable fish species of river Ganga under National Mission on Clean Ganga (NMCG) project. Earlier, Dr. K. D. Joshi, Head of the Centre, appraised the Honourable minister about the achievements of the Centre and major ongoing activities. Dr. U. S. Gautam, Director, ICAR - ATARI, Kanpur, was also present during the visit.

Secretary, DARE and DG, ICAR visited ICAR-CIFRI

Dr. Trilochan Mohapatra, Secretary, DARE and DG, ICAR visited ICAR-Central Inland Fisheries Research Institute, Barrackpore Kolkata on 15th June 2016 for the first time after he assumed office. In his address, he said that the foundation of inland fisheries growth in India was laid by CIFRI and to move forward we must focus on changes that occurred in resource size, habitat characteristics, biodiversity of the open water-bodies and the impact of pollution and climate change on these resources over the decades. He lauded the Institute's effort in mapping of open-water resources of different states on GIS platform. He emphasized that the Hon'ble Prime Minister has given the call for "Blue Revolution" and this institute has to play a very big role in this endeavor.

Dr. J. K. Jena, DDG (Fisheries Sciences) emphasized on the role played by this institute as the leader of inland fisheries during last seven decades. Earlier, Dr. V. R. Suresh, Director (Acting) briefed the activities and achievements of ICAR-CIFRI. Dr. Gopal Krishna, Director cum Vice Chancellor (Acting) ICAR-CIFE, Mumbai and Dr. P. G. Karmakar, Director, ICAR-CRIJAF, Barrackpore were also present on this occasion.

International yoga day

The institute celebrated International Yoga Day on 21st June, 2016. The Yoga Session was conducted under the guidance of eminent Yoga experts, Mrs. Romela Mustafi and Mr. Sujit Ghorei of Yoga Kendra, Barrackpore based on the Common Yoga Protocol provided by Ministry of AYUSH, Government of India. Earlier, on 20th June, 2016 a Workshop on, "Health benefits of Yoga" and a practice session was also organized. Staff members of ICAR-CIFRI and their family members attended the program.

National fish farmers' day

ICAR-CIFRI, Barrackpore celebrated National Fish Farmers' Day on 10th July 2016. Prof. Purnendu Biswas, Vice Chancellor, West Bengal University of Animal and Fishery Sciences, graced the occasion as Chief Guest. In his address, he urged State Government, ICAR-CIFRI, Universities, Entrepreneurs and Fish farmers to join hands for judicious utilization of the resources for the development of Fisheries Sector. He called for more interaction between innovative farmers of different States.

Sri Silbhadra Dutta, Member of Legislative Assembly, West Bengal, Guest of Honour. emphasized on more collaborative work through Centre-State coordination for

farmers' welfare and bringing research findings to farmers field. More than 100 farmers, State Government Officials, Scientists and staff of CIFRI attended the function. Six progressive fish farmers, representing West Bengal, Bihar, Jharkhand were conferred "Best Fish Farmer Award 2016" by the Institute.

ICAR foundation day

The institute celebrated ICAR Foundation Day at the Head Quarters on July 16, 2016. Dr. V. R. Suresh, Director (Acting). Dr. U. K. Sarkar, Head, RWF Division, Mr. N.K. Jha, AO, Dr. B. C. Jha, Former, HoD, and the other staff members of CIFRI shared their experiences on working in CIFRI.Dr. Utpal Bhaumik, Former HOD.

Independence day

The institute celebrated the 70th Independence Day of India at the ICAR-CIFRI, Barrackpore with great enthusiasm. Director, Dr. B.K Das hoisted the tri-colour and paid rich tribute to the nation. In his maiden Independence Day

speech, he addressed the staff and their family members and emphasized that present young generation should remember the sacrifice made by our earlier leaders. He also spoke about the contribution of ICAR as well as ICAR-CIFRI in nation building. CIFRI staff and their family members organized cultural events during the Independence Day celebration.

Installed CIFRI model cage in the campus pond

A 'CIFRI Model Cage' was installed on the occasion of AZADI 70 to showcase CIFRI's contribution in the field of cage culture in inland fisheries. All the ICAR-CIFRI staff gathered on the occasion. This model cage culture will help in hands-on-training and capacity building programmes on 'Inland Fisheries Management'.

Inauguration of 'Office-cum Ladies Room' for women cell

An "Office-cum Ladies Room for Women Cell" was inaugurated on 15th August, 2016. The members of CIFRI Women Cell and Women Complaint Committee joined hands together to organize a cultural programme on the occasion of AZADI 70. The room was allotted for better functioning of the women cell.

भा.कृ.अनु.प. केन्द्रीय अंतर्स्थलीय मात्सिकी अनुसंधान संस्थान बैरकपुर तथा इसके क्षेत्रीय केन्द्रों में हिंदी सप्ताह का आयोजन

भा.कृ.अनु.प. केन्द्रीय अंतर्स्थलीय मात्सिकी अनुसंधान संस्थान बैरकपुर मुख्यालय में दिनांक 14-21 सितम्बर, 2016 के दौरान हिंदी सप्ताह का आयोजन किया गया। इस दौरान अहिन्दी भाषी एवं हिन्दी भाषी कर्मचारियों के लिए अलग विभिन्न प्रतियोगिताएं जैसे हिंदी निबंध लेखन, टिप्पणी एवं पत्र लेखन, प्रशासनिक शब्दावली एवं श्रुत लेखन आदि प्रतियोगिताओं का आयोजन किया गया। सप्ताह के दौरान आयोजित प्रतियोगिताओं में सभी में काफी उत्साह दिखाई दिया। सप्ताह के दौरान आयोजित विभिन्न प्रतियोगिताओं के विजेता को समापन समारोह के अवसर पर मुख्य अतिथि श्री आथर्व त्रिपुरारी, विशेष महानिरीक्षक एवं उप महानिरोक्षक (ए. पी., बैरकपुर) तथा संस्थान के पूर्व प्रधान वैज्ञानिक डा. एन. पी. श्रीवास्तव द्वारा सम्मनित किया गया। समापन समारोह के दौरान अपने उदबोधन में डा. बी. पी. मोहान्ति ने वैज्ञानिक एवं प्रचलित पत्रिकाओं में वैज्ञानिक लेखों का हिन्दी रूपांतरण प्रकाशित करने पर और दिया। डा. उत्तम कुमार सरकार ने कक्ष कि संस्थान में हिन्दी के प्रयोग को बढ़ाने के लिए भारत सरकार द्वारा चलाई जा रही विभिन्न प्रोत्साहन योजनाओं में समस्त कर्मचारियों को समय समय पर अवसर कराया जाए एवं प्रोत्साहित किया जाए। श्री नवीन कुमार झा प्रशासनिक आधिकारी ने अपने उदबोधन ने सरकारी नीतियों एवं संवैधानिक दायित्वों पर सभासदो को अवगत कराया। उसी प्रकार संस्थान के सभि क्षेत्रीय केन्द्र में भी बहुत उत्साह के साथ आयोजन किया गया।

वडोदरा

बैरकपुर

इलाहबाद

Tribal Sub Plan activities

The Institute is continuing its efforts to uplift the socio-economic condition of the tribals in different parts of the country under the Tribal Sub Plan (TSP) programme. In the same tempo 32,000 fish fingerlings of Indian major carps were stocked in six freshwater and four brackishwater ponds with water area of 0.66 ha in Khansaheb village of Sagar Block of South 24 Parganas district in western side of the Sundarbans during the month of August, 2016. Inorganic fertilizers and fish feed were also distributed to the tribal fishers benefitting 40 tribal families in derelict ponds.

Stocking of fingerlings in Sagar Block of South 24 Parganas district

Training-cum-mass awareness programme at Sagar Block of South 24 Parganas district

A training-cum-mass awareness programme for utilization of derelict open water to rear and produce indigenous fish was organized during 16-17 September 2016. Proper stocking and effect of exotic species in the culture system were also discussed.

The programme was presided over by Dr. B.K. Das, Director, ICAR-CIFRI, Barrackpore. Smt. Mala Sinha, Pradhan, Khas Ramkarer Char Panchayat Samiti, Shri. Jagdish Chandra Barui, Joint BDO, Sagar; Shri. Ashok Kumar Das, FEO, Sagar, Department of Fisheries, W.B.; Shri. Kanai Hembram, President, Adivasi Sangha and CIFRI Scientists were among the dignitaries present on the occasion. A total of twelve cast nets, two drag nets, nets & rope for fencing the water bodies and one 5 HP water pump were distributed by the institute to the beneficiaries. A total of 250 fishers/fish farmers participated, of which 150 were tribal women farmers.

Distribution of inputs at Sagar Block of South 24 Parganas district

In the eastern flank of Sundarbans, ICAR-CIFRI has been undertaking TSP activities in Kalitala *Gram Panchyat* in Hingalganj block of North 24 Parganas district of West Bengal. A team visited and inspected the Sagunkhali Canal at Samsernagar during 22-23 July, 2016 from where fish mortality was reported by fishers. After analysing the water and fish samples necessay technical advice were given to fishers for controlling fish mortality in the canal.

Water quality analysis in canals

Investigation of fish disease

A total of 35,000 advanced fingerlings (8-10 cm size) of Indian major carps namely *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* were stocked in three canals with a total water area 0.07 sq. km during the month of August, 2016. CIFRI personnel, tribal fishers, local *Panchyat* members and forest department (Govt. of West Bengal) personnel took active part in the stocking of fish seeds. Forty one tribal families are being benefitted through the programme.

Stocking of fingerlings at Kalitala canal

In another attempt, two canals, namely, Adibasipara (0.01sq.km) at Birajnagar and Harintana (0.05 sq. km) at Satyanarayanpur in Bali Island (Sundarbans), Gosaba Block, South 24 parganas, were stocked with advanced fingerlings of Indian major carps @5000 nos /0.01 sq. km. during September 7-9, 2016. Twenty seven tribal families are being benefited from the carp rearing programme in canals. The CIFRI personnel provided technical guidance to tribal fishers for post stocking management of carp seeds in these canals.

The institute has also attempted to improve the livelihood of the tribal fishers of Purulia district of West Bengal through development of fisheries in the check dams and bundhs under TSP. 35,000 advanced fingerlings of *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* were stocked in Chakka Dam (7.0 hectare) located at Rajakhanda village, Puncha Block, and 6000 advanced fingerlings each were

Stocking of fingerlings at ponds of Bali island

stocked at Sarak Bundh (1.2 hectare) and Upper Bundh (1.2 hectare) at Village Pochagora under Kashipur Block, on 1st and 2nd October, 2016, respectively in the presence of local Panchyat members. Ninety five tribal families are being benefited from this programme.

Stocking of fingerlings at Purulia

Allahabad Centre has been conducting multiple fisheries development activities in the tribal areas of Chandan Chouki, Paliya Lakhimpur Kheri, Uttar Pradesh under TSP for last few years. In the same tempo, the Centre conducted activities including training cum awareness programme and distribution of fish seed (fingerlings) and feed in the first week of September 2016. About 60 participants comprising farmers and fishers attended the awareness programme and benefited from inputs distribution. Quality fish seed in the form of fingerlings (235 kg., comprising Indian major carps and exotic carps) were distributed to 47 progressive tribal fish farmers and stocked in their ponds. Fish feed (12.0 quintals, comprising mustard oil cake and rice bran in the ratio of 1:1) @ 30 kg /farmers to 40 farmers was also distributed. The beneficiaries were from tribal villages of in and around

Chandan Chouki area, Paliya tehsil, Lakhimpur-Kheri district, Uttar Pradesh.

Seed and feed distribution

Mera Gaon Mera Gaurav programme

ICAR- CIFRI Scientists adopted around 90 villages under *Mera Gaon Mera Gaurav* programme and are disseminating knowledge through discussion, meetings, phone calls, *kisan gosthi* and distribution of literatures for overall agricultural development. Scientists of Barrackpore Headquarters hold discussion with the farmers/*Gosthi* regarding productivity enhancement of agriculture crops, livestock and fisheries, effective method of pest and disease management, management of fish culture ponds, conservation of small indigenous fishes etc. In the process various problems were identified including non-availability of certified seeds in time, lack of awareness on hazards of use of non-recyclable plastics, lack of proper knowledge about scientific fish farming, poor storage condition of fish feeds, lack of facility for soil and water quality testing, scarcity of labour during peak agricultural season, lack of remunerative process for farm produce, low irrigation facility. Linkages were made with several agencies including nearby *Krishi Vigyan Kendras*, State Departments, local *Panchayat*, NGOs and ICAR institutes.

Scientists generated awareness on various issues including fish diseases, nursery pond management, hilsa conservation, soil and water testing, improved variety of crops, and pest/disease incidences in agricultural crops. Various literatures including leaflets, pamphlets on wide range of issues like 'Hilsa conservation for future generation', 'Integrated fish farming', 'Composite Fish Farming in Ponds', 'Potential of cage culture in Indian water', 'Fisheries management of floodplain wetlands', 'EUS disease in Fish', 'Pen culture in Beels', 'Fish as Health food' were distributed among the farmers.

Interaction with farmers

Field visit

Distribution of literatures

Scientists of Guwahati centre visited the adopted villages and organized an interactive programme in association with a Trust who are working for upliftment of the farmers on community-management principles. Farmers in the village mostly belong to scheduled caste and tribe families (75%). The scientists of the

centre visited the water bodies and made preliminary assessment of water quality as well as discussions with the fish farmers including the Trust members. In the interactive session, the team discussed about principles and practices in aqua-farming for development of fisheries in the area.

Discussion with Pradhan of Akaipur Panchayat

Interactive programme on fisheries development at Jajikona village, Kamrup, Assam

Swachh Bharat Abhiyaan

On the occasion of Swachhta Pakhwara started on 16th May, 2016 a team led by Dr. B. P. Mohanty, Head, FREM Division visited Mahadevananda Vidyalaya in the vicinity of CIFRI Headquarters to sensitize the students. Soaps/hand washes were distributed for making campaign more effective among the school children.

Awareness campaign at a school in Barrackpore

Distribution of soaps and other sanitizers among school children in Barrackpore

A cleanliness campaign was also organized by the institute at Sagar Island, Sundarbans on 16th September, 2016. The programme was organized at Ramkar K.M. Samabay Pre-Primary School, Khanshaheber Abad to sensitize the school children and their parents on importance of cleanliness in day-to-day life. An interactive session with the children and their teachers was also organized. Soaps/hand washes were distributed among the school children. A cleanliness rallywith the people of Khanshaheb Abad village was also organized to generate awareness among villagers of Sagar Island about *Swachhata Abhiyan*.

A special Swachhata Pakhwara was observed at ICAR-CIFRI Regional Centre, Guwahati during May 16-30, 2016. The Pakhwara started with oath taking ceremony followed by special cleanliness drive inside the Centre. All staff members participated in the day-long cleaning drive inside the

Awareness campaign at Sundarban villages

Swachh Bharat Abhiyan at a Sundarban villages

premises of the Centre. On the next day a meeting of all Heads of Offices located in the Central block of HOUSEFED Complex (10 offices) was convened at the Centre to discuss ways and means to maintain overall cleanliness of the building. CIFRI centre took the lead role and completed the overall cleaning work in three subsequent week-ends.

Swachhta pledge by the staff of CIFRI Regional Centre, Guwahati

Cleaning of laboratories, garages, lobbies, repairing and painting of grills was performed in a phased manner in the remaining days of the fortnight. Staff of the Centre also participated in a special cleanliness drive organized by HOUSEFED employee's association on 12th August.

Special cleanliness drive at the premises of the HOUSEFED Complex

Cleaning of office and office premises as Vadodara

Flash back : CIFRI @ 1980s

Freshwater Aquaculture Research & Training Centre, Dhauli

In the year 1980 CIFRI was one of the biggest research institutes under ICAR with 250 scientific and technical

Dr. A.V. Natarajan

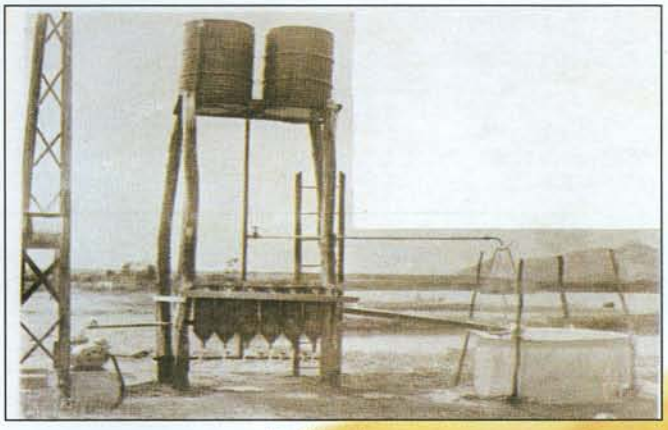
Dr. Arun G. Jhingran

personnel working under 37 research/survey centres spread across the country. The provision of funds for the financial year 1980-1981 was Rs. 1.78 crores which increased to Rs. 2.96 crores in 1989-90. Dr. A.V. Natarajan was at the helm of affairs up to 23.5.1986 followed by Dr. Arun G. Jhingran.

Construction of Freshwater Aquaculture Research & Training Centre (FARTC) consisting of 31 laboratory rooms, one conference room, one library, auditorium, aquarium, 110 quarters for staff and trainees hostel have been completed in the early 1980s. The office of FARTC has been shifted to the new laboratory buildings at Dhauli in 1980.

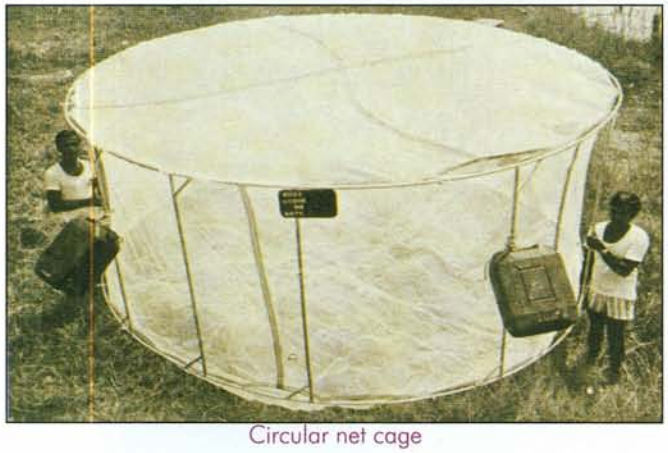
The institute achieved many significant research results during the decade. A new low cost field hatchery was developed which can be easily installed in rural areas with locally available materials during 1980.

The mandate of the Institute was modified giving added emphasis on capture fisheries resources of the country and the Institute was rechristened as Central Inland Capture Fisheries Research Institute (CICFRI) with effect from 01. 04. 1987. Under the changed setup, the CICFRI was entrusted with the responsibility to conduct research on open water bodies where the fisheries management norms are closely associated with environmental monitoring and conservation conducted under three divisions namely Riverine Division, with its headquarters at Allahabad, the Lacustrine Division with its headquarters at Bangalore and the Estuarine Division with its headquarters at Barrackpore. In the year 1988-89 the Institute's researches were organized under 20 research projects and a central Sector scheme carried out through its 15 research centres and 5 survey centres.



Field hatchery

The Institute has developed pen culture technology suitable for adoption in oxbow lakes and other riverine wetlands in 1983. A new inexpensive method has been developed for augmenting dissolved oxygen in fish and shrimp hatcheries in 1984. A low-cost coracle using high density polypropylene/high density polyethylene suitable for fishing in peninsular tanks and small reservoirs has been fabricated in 1984. A high rate of fish production to the tune of 16.64 kg/sq.m (166.43 t/ha) in eight months was obtained in a culture experiment involving *catla* from a 10.56 m^2 cage installed at Sankey tank, Bangalore in 1984. A new circular net cage for culture of carps/air-breathing fishes has been designed at the Bangalore Centre of CIFRI in 1985.



Circular net cage

Hybrids of mrigal female X common carp male were successfully produced for the first time in India in 1980. The scientists have been successful in inducing gynogenesis in the Indian major carp viz., rohu in 1981. The achievement is a major breakthrough in genetic selection work on Indian major carps. A remarkable achievement was made in 1981 in the direction of segregation of desirable spawn from the mixed riverine collections. Using CIFRI's technologies exceptionally higher production in experimental trials was made. Under the AICRP at Pune centre, one pond gave a record net production to the tune of 10650 kg/ha/yr in 1981. Large scale breeding of magur (*Clarias batrachus*) was achieved for the first time in 1982. The institute has succeeded in breeding the Indian major carps, rohu and mrigal at Sattal lake, at an altitude of 4000 ft above MSL in 1983. Polyploidy was successfully induced in Indian major carp, *Labeo rohita* at FARTC, Dhauli in 1984. Year- round carp seed production became a possibility when CIFRI achieved a major technical breakthrough in breeding Indian and exotic carps during off season months in different geoclimatic regions of the country in 1984. Experiments were successful in breeding of *Mystus Seenghala* in captivity and *Wallago attu* in 1985. The Institute has also developed techniques to breed, rear and culture the giant African snails in indoor terraria as well as in field snail houses in 1987-88.

CIFRI has achieved a major breakthrough in breeding and seed production of *tiger shrimp*, *P. monodon* in 1984 at Ennore, Madras. New shrimp production technology based upon new feed formulation developed by the Institute in 1985. In a significant breakthrough achieved at Rahara Research Centre of the Institute, a technology to rear 11-17 million fry of *C. mrigala* per hectare per crop of 15 days was developed in 1985. CIFRI reported the Epizootic Ulcerative Syndrome, the dreaded fish killer disease, for the first time from the estuarine waters in 1989-90. Bacteriological studies made on the EUS during December 1989 has further corroborated the earlier inference that bacteria play a definite role in the propagation of the dreaded disease.

Studies proved existence of two distinct sub-populations of *Tenualosa ilisha*. In the year 1980 artificial fecundation in *Hilsa* was successfully achieved through "wet" method of stripping and the percentage of fertilisation ranged from 90 to 95. The hatchlings stocked in pond have grown to an average length of 149 mm in 1.3 years. In another experiments *Hilsa* fry of 4-6 cm stocked and reared in a 0.1 ha pond have recorded a growth of about 240-250 g in 448 days indicating that *hilsa* can be raised to table size in ponds. In experiments of bio-controlling.

Stripping of Hilsa

agents it was proved that Lates effectively controlled the recruitment of tilapia in 1986-87. It has been shown that employing scientific management norms fish production from reservoirs could be enhanced to 200 kg $ha^{-1} yr^{-1}$ from 38 kg $ha^{-1} yr^{-1}$.

CIFRI has been continuing its efforts in collecting and analysing fish catch statistics from different rivers, lakes, estuaries and reservoirs. In the middle and lower stretch of Ganga the total fish landing at Daraganj, Sadiapur, Buxar, Bhagalpur and Lalgola centres were estimated to be 44.81t, 115.43 t, 17.41t, 110.93 t and 48.49 t, respectively during the period December 1979 to November 1980. The study shows declining trends of Indian major carps and a corresponding increase and dominance of minor carps, carp minnows and other uneconomic varieties in Ganga river. During November, 1981 to October 1982 the Hilsa landing from Hooghly estuary was estimated to be 6886 t which contributed to 30.8% of the total fish landing from the estuary. During the decade about 900 scientific papers on different aspects of inland fisheries were published by the scientists of the Institute.

Commensurate with great research achievements, the institute and the institute scientists were decorated with many honours and awards. Sri G.N. Saha was awarded with the Dhiru Morarjee Memorial Prize; Sri K. Raman was nominated by the Tamil Nadu Government as a member of working group for formulating the sixth five year plan for fisheries; Shri J.C. Malhotra, Shri S.N. Mehrotra and Dr. Peer

Shri J.C. Malhotra receiving the Rafi Ahmed Kidwai Memorial prize

Mohammed received Rafi Ahmed Kidwai Memorial prize for the biennium 1978-79; Dr. A.V. Natarajan received Honorary Life Fellowship of the Academy of Environmental Biology, India; Dr. V. R. P. Sinha was nominated by the Govt. of India to attend the Second NACA advisory committee meeting at Bangkok; Dr. G.N. Chattopadhyay won the US $ 500 prize of the "Review of the year competition 1984" conducted by the International Centre for Living Aquatic Resources Management, Manila; Dr. Ajoy Kr. Ghosh has been awarded Fellowships of both Zoological Society of India and Helminthological Society of India in 1989-90, to name a few. Many Scientists including Shri R.D. Chakraborty, Shri R.M. Bhowmick visited many countries like Vietnam, Thailand to offer their expertise in inland fisheries and aquaculture management. Many foreign trainees including that of Srilanka, Bangladesh, Laos, Brunea, Burma, China, Philippines, Indonesia, Malayasia, Pakistan, Papua New Guinea, Egypt, Nigeria, Thailand got trained in different disciplines of freshwater aquaculture and pursued PhD programmes.

Former Prime Minister Sh. Rajiv Gandhi visiting the Fisheries Pavilion at Amethi on 11.03.1989

CIFRI pavilion was adjudged the best among Govt. of India stalls in the National Agricultural Fair-81 at Ludhiana and was also awarded a special prize in the category of Government of India stall at the 3rd National Agricultural Fair 1982 held at Calcutta. The KVK, Kausalyaganga has been selected for participation in the Nutrition Education Project being funded by UNICEF in 1984. The FAO has adopted FARTC as the Regional Lead Centre under its programme of aquaculture development and coordination. The CIFRI technology for recycling the sewage waste through aquaculture formed the basic component of the Ganga Action Plan. The institute served as consultant of the Agricultural Finance Corporation for preparing massive fisheries development master plan for the North Eastern States.

CIFRI Pavilion got special prize at 3rd National Agricultural Fair 1982, Calcutta

Compiled & edited by Arun Pandit

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किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद
Agrisearch with a human touch

Volume 21, No.1 April - September, 2016 ISSN:0972-0774

सिफरी समाचार CIFRI NEWS

अनुसंधान उपलब्धियाँ

ओडिशा के चिलिका लैगून में *डायसिना अलबिडा* (पर्सीफार्सिस : सीयानिडे) के स्टॉक की स्थिति

चिलिका लैगून में पाई जाने वाली *डायसिना अलबिडा* (पर्सीफोर्म्स : सीनिडा) की मांग बहुत अधिक है पर गत् 15 वर्शों से इसके उत्पादन में लगातार कमी देखी जा रही है। वर्श 2001–02 में इसका उत्पादन 1024 टन था जो वर्श 2015–16 में घटकर 431 टन रह गया है। उत्पादन में आयी इस कमी को अक्टूबर 2012 से सितम्बर 2015 के दौरान इस प्रजाति के उत्पादन संबंधी वार्शिक एवं मासिक आंकड़ों के आधार पर आंका गया है। परिणाम यह बताते हैं कि इश्टतम उत्पादन 510 टन प्रति वर्श प्राप्त करने के लिये मत्स्ययन प्रयास 20 प्रतिशत अधिक किया गया जिससे स्पॉन का स्टॉक बायोमास 19 प्रतिशत घट गया और फिश रिक्रुटमेन्ट में भी कमी आई। इस प्रजाति की लंबाई रिक्रुटमेन्ट के समय 45 मि.मी. तथा पकड़ने के समय केवल 180. 5 मि.मी. थी जो 1970 के दशक की अपेक्षा कम (112 मि.मी. एवं 204 मि.मी.) थी। वर्तमान आंकड़ें यह दिखाते हैं कि इस प्रजाति का अत्यधिक दोहन हुआ है। यदि इस प्रजाति का दोहन ऐसे ही होता रहा तो इसके उत्पादन में और भी कमी आयेगी। अतः मत्स्ययन प्रयास 20 प्रतिशत कम किया जाना चाहिये जिससे दीर्घकालिक उत्पादन प्राप्त होता रहे।

वी आर सुरेश, एस के कर्णा, एम मुखर्जी, जे मुखर्जी, डी पंडा, मानस एच एम, आर के मान्ना, ए राउत एवं बी के दास

सुन्दरवन के निचले क्षेत्र में मत्स्य उत्पादन संरचना में बदलाव

वैश्विक तौर पर जलवायु परिवर्तन होने के कारण मत्स्य प्रजातियों की उपलब्धता एवं उत्पादन, दोनों में ही ह्रास देखा जा रहा है। वर्श 2015–16 में शीत ऋतु में सुन्दरवन के निचले क्षेत्र में बैगनेट मात्स्यिकी आंकड़ों तथा संस्थान द्वारा वर्श 2009 में एकत्रित आंकड़ों के विश्लेशण यह बताते हैं कि मछलियों की उपलब्धता में कमी आई है। *हारपेडोन नेहेरस* जो 2009–10 में शीत ऋतु में सबसे अधिक 18. 34 (1362.92 टन) प्रतिशत थी, वर्श 2015–16 में घट कर 12.33 (1475.29 टन) प्रतिशत रह गई है। पर कम मांग वाली *सेकुटर इनसिडिएटर* प्रजाति की उपलब्धता में बढ़त देखी गई। इसी प्रकार सारडीन प्रजातियों (*सारडिनेला गिबोसा, एस. लॉन्जिसेपस* और *एस फिम्ब्रिएटा*) का प्रतिशत 0.48 (वर्श 2009–10) से बढ़कर 10.66 प्रतिशत (वर्श 2015–16) हो गया है। कुल मत्स्य उत्पादन 7431.59 टन (वर्श 2009–10) से बढ़कर 11962.52 टन (वर्श 2015–16) प्राप्त हुआ है पर इसमे उन प्रजातियों की संख्या अधिक है जिनका बाजार मूल्य कम और अतिजीविता अवधि कम है।

रोशिथ सी एम, आर के मान्ना, एस के दास, ए रॉयचौधुरी, सी एन मुखर्जी, ए मित्रा, अभिजीता सेनगुप्ता एवं डी साहा

सुन्दरवन क्षेत्र में केकड़ा पालन – आजीविका का साधन

सुन्दरवन क्षेत्र में पायी जाने वाली केकड़ा प्रजाति, *साइला सेरेटा* तथा *एस ओलिविसिया* का हमारे देश एवं विदेशी बाजारों में बहुत अधिक मांग है। सुन्दरवन के मध्य एवं निचले क्षेत्र में इन केकड़ों को स्थानीय गिअर जाल, 'डॉन' द्वारा पकड़ा जाता है क्योंकि ये गिअर सस्ते होते हैं और लकड़ी से बने 6 से 8 मी. लम्बी पारंपरिक बोट द्वारा इनसे केकड़ों को पकड़ने में आसानी होती है। इन बोट में 3 से 5 मछुआरें एक साथ मिलकर केकड़ों को पकड़ते हैं। इन केकड़ों का मत्स्ययन पूर्णतः अमावश्या/पूर्णिमा के दिन आने वाले ज्वार पर निर्भर करता है। आमतौर पर, केकड़ों को महीने के 15 दिनों में ही पकड़ते हैं जब ज्वार अधिक होता है क्योंकि कम ज्वार वाले दिनों में इनका मत्स्ययन संभव नहीं है। इन केकड़ों का औसत लैंडिंग जून से अक्टूबर के बीच 200 कि.ग्रा. प्रति बोट प्रति माह तथा नवम्बर से मार्च के बीच 400 कि.ग्रा. प्रति बोट प्रति माह दर्ज किया गया। इन केकड़ों का आकार 100 से 600 ग्रा. के बीच होता है तथा इनका मूल्य इनके आकार, लिंग और विशिश्टता पर निर्भर करता है। उदाहरणतः मादा केकड़ों का मूल्य नर केकड़ों की अपेक्षा अधिक होता है। इन केकड़ों को पकड़ने के बाद सीधे नदी किनारे बनाये डिपो (स्थानीय नाम – कांकरा आढ़त) पर ले जाया जाता है। गर्मियों (₹30,000 से ₹35,000 प्रति 100 कि. ग्रा.) की तुलना में शीतकाल (₹75,000 से ₹80,000 प्रति 100 कि.ग्रा.) में इन केकड़ों का मूल्य अधिक होता है।

टी निरूपदा चानु, आर के मान्ना, एस के दास, एस के कौशलेश, रोशिथ सी एम, डी सुधीशन एवं मानस एच एम

मडस्कीपर – गुजरात के नर्मदा ज्वारनदमुख की मात्स्यिकी

गुजरात के नर्मदा ज्वारनदमुख में दलदली प्रजाति '*लेवता*' को पारंपरिक विधि से प्रायः वर्श भर पकड़ा जाता है। इस प्रजाति को पकड़ना एक कठिन कार्य है और इसके लिये विशेश तकनीक की आवश्यकता पड़ती है क्योंकि पानी से निकलने के बाद भी ये बहुत ही छटपटाते रहते हैं। इसको पकड़ने की लागत मूल्य कम होती है तथा वर्श भर इनकी उपलब्धता होने के कारण इसको अधिक से अधिक लोग इसकी मात्स्यिकी से जुड़े हुये हैं। वर्श 2014–15 में इसका उत्पादन 299 मेट्रिक टन था जो ज्वारनदमुख से प्राप्त कुल मत्स्य उत्पादन का 17 से 18 प्रतिशत आंका गया है। रिपोर्ट अवधि के दौरान तीन प्रजातियों, *Boleophthalmus dussumieri* Valenciennes, 1837, *Periophthalmodon schlosseri* (Pallas, 1770) और *Pseudapocryptes elongatus* (Cuvier, 1816)को दर्ज किया गया है। लेवता को विभिन्न जालों जैसे, 'फंदा', स्टेक नेट,

बैगनेट, स्कुप नेट, पुश नेट, गिलनेट, कास्ट नेट द्वारा पकड़ा जाता है। लेवता का प्रति इकाई मत्स्ययन प्रयास 0.25 से 2.0 कि. ग्रा. प्रति घंटा है तथा इसका मूल्य ₹70 से ₹120 प्रति कि.ग्रा. होता है।

दिबाकर भक्ता, डब्ल्यु आनंद मिति, वैशाख जी, एस के दास एवं आर के साह

चांदिल जलाशय की मत्स्य जीव (इक्थियोफौना) विविधता का सामयिक एवं स्थानिक भिन्नता

झारखंड के चांदिल जलाशय के इक्थियोफौना विविधता का सामयिक एवं स्थानिक भिन्नता का अध्ययन किया गया। इस जलाशय में कुल 37 मत्स्य प्रजातियों की उपलब्धता को दर्ज किया गया। सैम्पलिंग कार्य जलाशय के विभिन्न स्तरो जैसे, नदीय, संक्रांति तथा झील क्षेत्र में ग्रीश्म, मानसून तथा शीत ऋतु में गिलनेट एवं ड्राग नेट द्वारा किया गया। प्राप्त आंकड़ों का विश्लेशण परमानोवा (Permutational multivariate analysis of variance) मानक तकनीक से किया गया। इसके अनुसार, जलाशय के संक्रांति क्षेत्र में अन्य क्षेत्रों से मत्स्य विविधता अधिक थी। इसी प्रकार, सिमपर (SIMPER) विश्लेशणं के अनुसार, छोटी देशी प्रजातियां जैसे, *सालमोफेसिया फुलो* एवं *चान्दा नामा* जलाशय के विभिन्न स्थानिक क्षेत्रों में पाये गये।

लियानथुमलुइया, संध्या के एम, यु के सरकार, मिशाल पी, विकास कुमार, सुमन कुमारी, गुंजन कर्नाटक एवं ए के बेरा

पिंजरा पालन में संपूरक भोजन के रूप में शराब कारखाने के अवशिश्ट पदार्थों का *लेबियो रोहिता* प्रजाति की वृद्धि दर पर प्रभाव

पिंजरा पालन में शराब कारखाने के अवशिश्ट तत्वों का *लेबियो रोहिता* प्रजाति के वृद्धि दर पर प्रभाव को आंका गया। इसके लिये रोहू मछली की 35 से 50 ग्रा0 वाली बीजों को 5X5X3.5 क्यूबिक मीटर. वाली जी. आई. पिंजरों में रखा गया। इन मछलियों को दिन में दो बार, (सुबह 10 बजे और संध्या 4 बजे) समान अनुपात में उनके शारीरिक भार के 5 प्रतिशत की दर से आहार दिया गया। इसके 90 दिनों के बाद इनका शारीरिक भार एवं भोजन संबंधी सूचनाओं का विश्लेशण किया गया। इसमें यह देखा गया कि जिन मछलियों को सोयाबीन एवं शराबखाने के अवशिश्ट से बना भोजन दिया गया है उनका शारीरिक विकास उत्तम ढंग से हुआ है तथा ऐसे आहार की लागत मूल्य भी सोयाबीन से बने अन्य आहार की तुलना में कम (लगभग 16.4 प्रतिशत कम) है।

एम ए हसन, मो0 अफ्ताबुद्दीन, डी के मीणा एवं मिशाल पी

मछलियों में होने वाली ***Isoparorchis hypselobagri*** बीमारी की पहचान

चांदिल जलाशय के लैंडिंग केन्द्रों से मछलियों के नमूनों को एकत्र किया गया तथा मछलियों में हुये संक्रमण का परीक्षण किया गया। परीक्षण में स्पाईनी ईल मछली, *Mastacembellus armatus* एवं एओर टेंगरा, *Sperata seenghala* मछलियों की उदरीय त्वचा और मांसपेशियों पर काले धब्बे पाये गये। मृत मछलियों के परीक्षण के दौरान इन मछलियों के त्वचा छिद्रों तथा मांसपेशियों में घाव देखे गये। मछलियों में हुये इस संक्रमण को सर्वप्रथम चांदिल जलाशय में इस परजीवी की उपस्थिति को प्रथम बार देखा गया है तथा इस दिशा में और भी अनुसंधान कार्य आवश्यक है।

ए के बेरा, मिशाल पी, लियानथुमलुइया, गुंजन कर्नाटक एवं यू के सरकार

स्टॉक संवर्धन हेतु असम की बीलों में *मेक्रोफाइट ग्रसन* का आंकलन

असम के 4 जिलो में स्थित दस संचयित (बंद / मौसमी बील) एवं 10 असंचयित (खुला बील) बीलों में *मेक्रोफाइट ग्रसन* का आंकलन किया गया। इन बीलों मे *मेक्रोफाइट ग्रसन* 5 से 8 प्रतिशत तक पाया गया। इन बीलों में तैरते हुये *मेक्रोफाइट* प्रजातियों में *Eichorrnia* प्रजाति 90 प्रतिशत तथा अन्य प्रजातियों में *Salvinia* sp., *Pistia* sp., *Azolla* sp., और *Lemna minor*, जलमग्न *मेक्रोफाइट* प्रजातियों में *Hydrilla* sp, *Vallisneria* sp. और *Ceratophyllum* sp. तथा जल में जमे हुये *मेक्रोफाइट* प्रजातियों में *Nymphea* sp., *Nelumbo* sp., *Nymphoides* sp और *Trapa* sp पाये गये। इन बीलों में *मेक्रोफाइट ग्रसन* को तीन वर्गों में रखा गया है – (1) अल्प ग्रसन, 25 प्रतिशत से कम, (2) मध्यम ग्रसन, 25 से 50 प्रतिशत ग्रसन एवं (3) उच्च ग्रसन, 50 प्रतिशत से अधिक। साथ ही इन ग्रसित बीलों से प्राप्त मत्स्य उपज को भी इन वर्गों में रखा गया। संचयित बीलों में से अधिक स्थूलपादप (*मेक्रोफाइट*) ग्रसन वाली बीलों का न्यूनतम औसत मत्स्य उत्पादन 547.31 कि.ग्रा. प्रति हे0 प्रति वर्श तथा कम ग्रसित बीलों का औसत उत्पादन 1076.59 कि.ग्रा. प्रति हे0 प्रति वर्श प्राप्त किया गया। इन परिणामों से यह निश्कर्श निकलता है कि इन बीलों में मेक्रोफाइट ग्रसन और उत्पादन में विपरीत संबंध होता है। मध्यम तौर पर ग्रसित बीलों का उत्पादन औसत (714 कि.ग्रा. प्रति हे0 प्रति वर्श) देखा गया। *मेक्रोफाइट ग्रसन* का प्रबंधन उपायों पर भी विपरीत असर पड़ता है। कम ग्रसित बीलों की अपेक्षा अधिक ग्रसित बीलों में प्रबंधन तकनीकों को क्रियान्वित करना कठिन होता है। जिन बीलों में प्रबंधन तकनीकों का सही प्रकार से प्रयोग किया जाता है, उनमें मत्स्य बीजों का संग्रहण भी भली–भांति (3000 से 7000 अंगुलिकायें प्रति हे0) होता है। अन्य बीलों में स्टॉकिंग दर 500 से 70000 जीरा / अंगुलिकायें प्रति हे0 देखी गईं। असंचयित बीलों में मध्यम तौर पर ग्रसित बीलों का मत्स्य उत्पादन सबसे अधिक (507.59 कि.ग्रा. प्रति हे0 प्रति वर्श) तथा अल्प एवं उच्च तौर पर ग्रसित बीलों का मत्स्य उत्पादन क्रमशः 147 कि.ग्रा. प्रति हे0 प्रति वर्श तथा 139.6 कि.ग्रा. प्रति हे0 प्रति वर्श था। पर समस्त परिणाम यह बताते हैं कि सामान्य तौर पर ग्रसित (25 से 50 प्रतिशत) असंचयित बीलों में अधिक उत्पादन की संभावना है।

एस येंगकोकपम, बी के भट्टाचार्य, डी देबनाथ, ए के यादव, पी दास, एन सरमा, एस बोराह, के के सरमा एवं एन एस सिंह

असम के दीपर बील में देशी मत्स्य प्रजातियों के लंबाई–भार संबंध

असम के दीपर बील में प्रथम बार 9 देशी मत्स्य प्रजातियों, ***Trichogaster chuna*** **(Hamilton, 1822),** ***Trichogaster lalius*** **(Hamilton, 1822),** *Trichogaster fasciata* **(Bloch & Schneider, 1801),** ***Chanda nama*** **Hamilton, 1822,** ***Parambassis lala*** **(Hamilton, 1822),** ***Glossogobius giuris*** **(Hamilton, 1822)** और ***Macrognathus aral*** **(Bloch & Schneider, 1801)** के लंबाई–भार संबंध का आंकलन किया गया। इन प्रजातियों में 2 शाकभोजी, 1 जंतुप्लवक भोजी, 3 सर्वाहारी, 1 कीटभोजी तथा 2 मांसभोजी प्रजातियां हैं। दीपर बील के निकटवर्ती लैंडिंग केन्द्रों से फरवरी 2016 से अगस्त 2016 के बीच कुल 911 मत्स्य प्रजातियों को एकत्र किया गया। परीक्षण में यह देखा गया कि 4 प्रजातियों (*T. fasciata*, *T. lalius*, *C. nama* और *M. aral*) का संभावित विकास के अनुरूप नहीं हुआ है। दो प्रजातियों (*P. lala* और *G. giuris*) का विकास सामान्य तथा तीन प्रजातियों (*T. chuna*, *P. sophore* और *A. mola*) का विकास उत्तम हुआ है।

एस बोराह, बी के भट्टाचार्य, बी जे सौद, ए के यादव, डी देबनाथ, एस येंगोकपम, पी दास, एन शर्मा, एन एस सिंह एवं के के सरमा

असम के बीलों के मत्स्य उत्पादन पर स्टॉक संवर्धन का प्रभाव

असम के नावगांव जिले में स्थित तीन बीलों, दमाल (15 हे0), सुकदोल–सरूबारी (17 हे0) तथा मेर बील (19 हे0) क्षेत्र में मत्स्य स्टॉक संवंधन के प्रभाव का आंकलन किया गया। सुकदोल–सरूबारी बील में स्टॉकिंग नहीं किया गया था, दमाल बील में अतिरिक्त स्टॉकिंग देखा गया (2000 मत्स्य बीज प्रति हे0 की दर से) तथा मेर बील में यह स्टॉकिंग 3000 मत्स्य बीज प्रति हे0 की दर से था। एनालिसिस ऑफ वेरियेन्स (ANOVA) तकनीक द्वारा वर्श 2012–2016 के दौरान मत्स्य उपज दर पर स्टॉकिंग के प्रभाव का आंकलन किया गया। इन चार वर्शों के प्ररिणाम यह बताते हैं कि असंचयित बीलों में मत्स्य उपज दर सबसे कम (367–717 कि.ग्रा. प्रति हे. प्रति वर्श तथा औसत 472 कि.ग्रा. प्रति हे. प्रति वर्श) था। संचयित बीलों में सबसे अधिक मत्स्य उपज दर मेर बील (1300–1501 कि.ग्रा. प्रति हे. प्रति वर्श तथा औसत 1381 कि.ग्रा. प्रति हे. प्रति वर्श) का था। दमल बील का मत्स्य उपज दर 767–1307 कि. ग्रा. प्रति हे. प्रति वर्श तथा औसत 924 कि.ग्रा. प्रति हे. प्रति वर्श देखा गया। प्राप्त परिणाम यह बताते हैं कि स्टाकिंग दर अधिक होने से मत्स्य उपज दर अधिक होता है।

ए के यादव, बी के भट्टाचार्य, पी दास, डी देबनाथ, एस येंगोकपम, एस बोराह, एन शर्मा एवं एन एस सिंह

असम के आर्द्रक्षेत्रों में मछलियों में बीमारी संक्रमण तथा उनकी मृत्यु के कारण हुई आर्थिक क्षति का आंकलन

असम के आर्द्रक्षेत्रों में मछलियों में बीमारी तथा उनकी मृत्यु के कारण हुई आर्थिक क्षति के आंकलन के लिये नावगांव के 24 बीलों एवं मोरीगांव के 30 बीलों का सर्वेक्षण किया गया। औसतन, नावगांव के बीलक्षेत्र 28 हे. तथा मत्स्य उपज 827 कि.ग्रा. प्रति हे. तथा प्रति बील आर्थिक क्षति का प्रतिशत एवं कुल क्षति क्रमशः 13.46 प्रतिशत तथा ₹3,66,205 आंका गया। इन बीलों में अधिकतर छोटी अंगुलिकाओं को उच्च घनत्व दर पर (औसतन 27159 अंगुलिकायें प्रति हे.) पर संग्रहित किया जाता है। इससे मत्स्य बीज पर लागत बढ़ जाती है। मोरीगांव जिले में प्रति बील का क्षेत्रफल एवं मत्स्य उत्पादन क्रमशः 35.47 हे. एवं 549 कि.ग्रा प्रति हे. तथा कुल वार्शिक क्षति का प्रतिशत 11.05 प्रतिशत तथा ₹8445 आंका गया है। मोरीगांव जिले के बीलों का संग्रहण घनत्व कम (894 अंगुलिकायें प्रति हे.) था। इन बीलों में मछलियों की मृत्यु का कारण घाव, ड्रॉप्सी, फिन का सड़ना, तथा सिर में छेद होना देखा गया पर अधिकतर मछलियों की मृत्यु जल में अपशिश्ट जलों के मिलने के कारण हुई है। कुछ अन्य कारणों में घरेलु मलजल/कारखानों से निकला गन्दा जल, बील में जूट को गलाने की प्रक्रिया, अंधाधुंध संग्रहण, बील क्षेत्र में *मेक्रोफाइट Eichhornia* का अत्यधिक विकास होना आदि दर्ज किया गया है।

डी देबनाथ, एस के मान्ना एवं डी जे देवनाथ

चिलिका लैगून की लवणीयता

चिलिका लैगून क्षेत्र को लवणीयता के प्रतिशत के आधार पर चार भागों में रखा गया है – बाहरी, मध्य, उत्तरी एवं दक्षिणी भाग। इस लैगून में समुद्री जल के प्रवाह विनिमय के कारण इसकी लवणीयता के साथ इसके जैविक गुणों में भी परिवर्तन होता रहता है। मार्च 2001 से मार्च 2010 के बीच इन चार भागों को स्ट्रकचरल टाइम सीरीज मॉडेलिंग (STSM) द्वारा विश्लेशण किया गया। मार्च 2001 एवं मार्च 2010 में बाहरी भाग की औसत लवणीयता क्रमशः 32.2 पीपीटी तथा 26.76 पीपीटी दर्ज की गई। इसी प्रकार इन दोनों वर्शों में दक्षिणी भाग की लवणीयता 12.94 पीपीटी तथा 9.68 पीपीटी, मध्य भाग का 12.71 पीपीटी तथा 6.83 पीपीटी तथा उत्तरी भाग का 5.49 पीपीटी तथा 3..62 पीपीटी पाई गई। परिणाम यह बताते हैं कि समुद्री मुहाने पर गाद के जमाव के कारण लैगून में मीठाजल के प्रवाह में लगातार कमी आई है जिसके लिये समुद्री मुहाने का नियमित तौर पर निरीक्षण अत्यन्त आवश्यक है।

आर के रमण, वी आर सुरेश, एस के कर्ण एवं बी के दास

सुन्दरवन के नामखाना ब्लाक के मछुआरों का भोजन एवं इनमें होने वाली बीमारियां

नामखाना के मछुआरों के जीवन शैली के अध्ययन में यह पता चला कि ये मुख्यतः इंडियन मेजर कार्प प्रजातियों को खाते हैं। छोटी देशी मत्स्य प्रजातियों की मांग यहां कम है। लगभग 23 प्रतिशत लोग स्थानीय तौर पर उपलब्ध ज्वारनदमुख प्रजातियां जैसे लोटे मछली (*Harpadon nehereus*), चूना (*Stolepherus sp.*), गंगा मोरोला (*Escualosa thoracata*) एवं आमुदी (*Coilia sp.*) मछलियों को इनमें उपस्थित प्रोटीन की प्रचुरता कि लिये खाते हैं। यहां अधिकतर लोग मछलियों को खाना (95 प्रतिशत) पसंद करते हैं अतः यहां मुर्गी, पशुमांस तथा अण्डों का सेवन नहीं के बराबर है। दालों में केवल खेसारी दाल (*Lathyrus sativus*) ही खाते हैं। यहां अधिकतर लोग निर्धन हैं इसलिये इनके स्वास्थ्य पर इसका प्रतिकूल प्रभाव पड़ता है। ये लोग निर्धनता एवं स्वच्छ पर्यावरण के अभाव में प्रायः कुपोशण एवं बीमारियों, जैसे आंखों की बीमारी, बुखार, सिर में दर्द एवं जोड़ों में दर्द से पीड़ित रहते हैं। गरीबी के कारण ऐसे में ये लोग गांव के नीम हकीम डॉक्टरों से इलाज करवाते हैं जिससे इनकी बीमारियां और भी जटिल रूप ले लेती हैं।

अपर्णा रॉय, अभिशेक घोश एवं सुप्रीति बाइन

गंगा नदी के निचली क्षेत्रों में क्लोरोफिल–ए की उपस्थिति एवं जलवायु भिन्नता में परिवर्तन

किसी भी जलक्षेत्र में क्लोरोफिल–ए की उपस्थिति इसकी मूल उत्पादकता को दिखाती है। अतः हुगली नदी के त्रिवेणी तथा गोदाखाली क्षेत्रों में क्लोरोफिल सान्द्रता का नदीय पर्यावरण पर प्रभाव का आंकलन किया गया। अध्ययन में वायु तापमान एवं कुल क्षारीयता के बीच सकारात्मक संबंध दर्ज किया गया। वर्तमान अध्ययन के अनुसार, हुगली नदी के इन क्षेत्रों (त्रिवेणी में 0.025 µg/l तथा गोदाखाली में 0.012 µg/l) में क्लोरोफिल सान्द्रता अधिक पाई गई है। पर क्लोरोफिल सान्द्रता और नाइट्रेट के बीच नकरात्मक संबंध देखने को मिला क्योंकि पादपप्लवक जल से नाइट्रेट को ग्रहण करते हैं। इसी प्रकार, घुलित ऑक्सीजन एवं वायु और जल के तापमान में भी नकरात्मक संबंध देखने को मिला क्योंकि उश्णकटिबंधीय देशों के जलक्षेत्रों के अपरदों तापमान बढ़ने से नश्ट हो जाते हैं। अतः प्राप्त परिणामों के आधार पर जलवायु कारकों के पारस्परिक संबंधों पर एक पूर्वानुमान माडल का विकास किया जा सकता है।

सोमा दास सरकार, यू के सरकार, एम नस्कर, के रॉय एवं ए के बोस

भोमरा बील की जलवायु भिन्नता का मत्स्य उत्पादन पर प्रभाव

पश्चिम बंगाल में स्थित भोमरा बील एक अर्द्धबंद गोखुर आर्द्रक्षेत्र है। इसका क्षेत्रफल कुल 45.7 हे0 है तथा इसके 20 से 25 हे0 जलक्षेत्र में मत्स्य उत्पादन किया जाता है। इस क्षेत्र में गत् दशकों (1985–2015) की जलवायु परिवर्तन के प्रभाव का आंकलन किया गया। इसमें यह देखा गया है कि औसत वायु तापमान में 0.18 डिग्री सेंटीग्रेड की वृद्धि तथा वर्शापात में 185 मि. मी. का ह्रास हुआ है। गत् वर्शो के आंकड़ें यह बताते हैं कि वायु का तापमान बढ़ने से मत्स्य उपज में वृद्धि हुई किन्तु वर्शापात के बढ़ने से मछली पालन दक्षता में कमी आती है। प्रारंभिक अध्ययन के अनुसार, यदि जलवायु परिवर्तन की गति इसी प्रकार से रही तो मत्स्य उपज (+112.55 कि.ग्रा. प्रति वर्श) एवं मत्स्य कृशि दक्षता (+2.27 प्रतिशत प्रति वर्श) में वृद्धि की संभावना है। न्युट्रियन्ट साइक्लिंग के द्वारा प्लवक वृद्धि के कारण मत्स्य उपज में बढ़ोतरी संभव है पर यदि वर्शापात अधिक हुआ तो मत्स्य कार्य कम होने या बंद होने अथवा बाढ़ के कारण मछलियों के दूसरे क्षेत्रों में बह जाने के कारण मत्स्य उत्पादन में कमी हो सकती है। पर भविश्य में भोमरा आर्द्रक्षेत्र में जल दबाव, जलापूर्ति में कमी तथा तलछट के स्तर में वृद्धि के कारण जल धारण क्षमता घटने से मत्स्य उपज में कमी आ सकती है।

गुंजन कर्नाटक, यू के सरकार एवं के रॉय

असम के सोरभोग बील में मत्स्य स्टॉक संवर्धन कार्यक्रम

संस्थान के क्षेत्रीय केन्द्र, गुवाहाटी के द्वारा एएफडीसी निगम गुवाहाटी के सहयोग से बारपेटा जिले के सारभोग बील में मत्स्य स्टॉक संवर्धन कार्यक्रम किया गया। यह बील लगभग 34 कि.मी. क्षेत्र में फैला हुआ है। इसके लिये *कतला कतला, लेबियो रोहिता* तथा *सिरहिनास मृगला* की अंगुलिकाओं को 10 अक्टूबर 2015 को 3000 अगुलिकायें प्रति हे0 की दर से बील में स्टॉक किया गया। प्रति तीन महीने पर सैम्पिलिंग किया गया। अंत में यह देखा गया कि रोहू, कतला और मृगल के शारीरिक भार में वृद्धि पाई गई।

बी के भट्टाचार्य, पी दास, एस बोराह, एस येंगोपम, डी देबनाथ, ए के यादव, एन शर्मा, एन एस सिंह एवं के के सरमा

हिमाचल प्रदेश के जलाशयों में पिंजरा पालन – संस्थान की एक पहल

संस्थान एवं हिमाचल प्रदेश के मात्स्यिकी विभाग द्वारा यहां के जलाशयों में पिंजरे में मछली पालन परियोजना का आरंभ किया गया है। इसके लिये कुल 48 तैरते हुये पिंजरों को गोविंदसागर के भाकरा तथा पोंग के खटियार क्षेत्र में लगाया गया। प्रति पिंजरे का आकार 6मी. x 4 मी. x 4 मी. रखा गया है। इन पिंजरों में पंगेशियस (*Pangasianodon hypophthalmus*) के 0.8 से 0.9 ग्रा. वाली मत्स्य बीजों को डाला गया।

ए के दास, यू के सरकार, विकाश कुमार, पी मिशाल, गुंजन कर्नाटक एवं बी के दास